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Hundreds upon hundreds of Kingfishers are constantly on duty with the Navy over the seven seas.

Seeking out the enemy, attacking submarines and directing gunfire are some of the vital tasks assigned to these versatile Vought-Sikorsky observation scouts.

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The great ships of the air, succeeding ocean liners down the launching ways, will ply the boundless ocean of space — crossing land and sea to carry cargoes directly to port of destination on the fastest ton-mile basis. Such huge transports rely on power by Wright.

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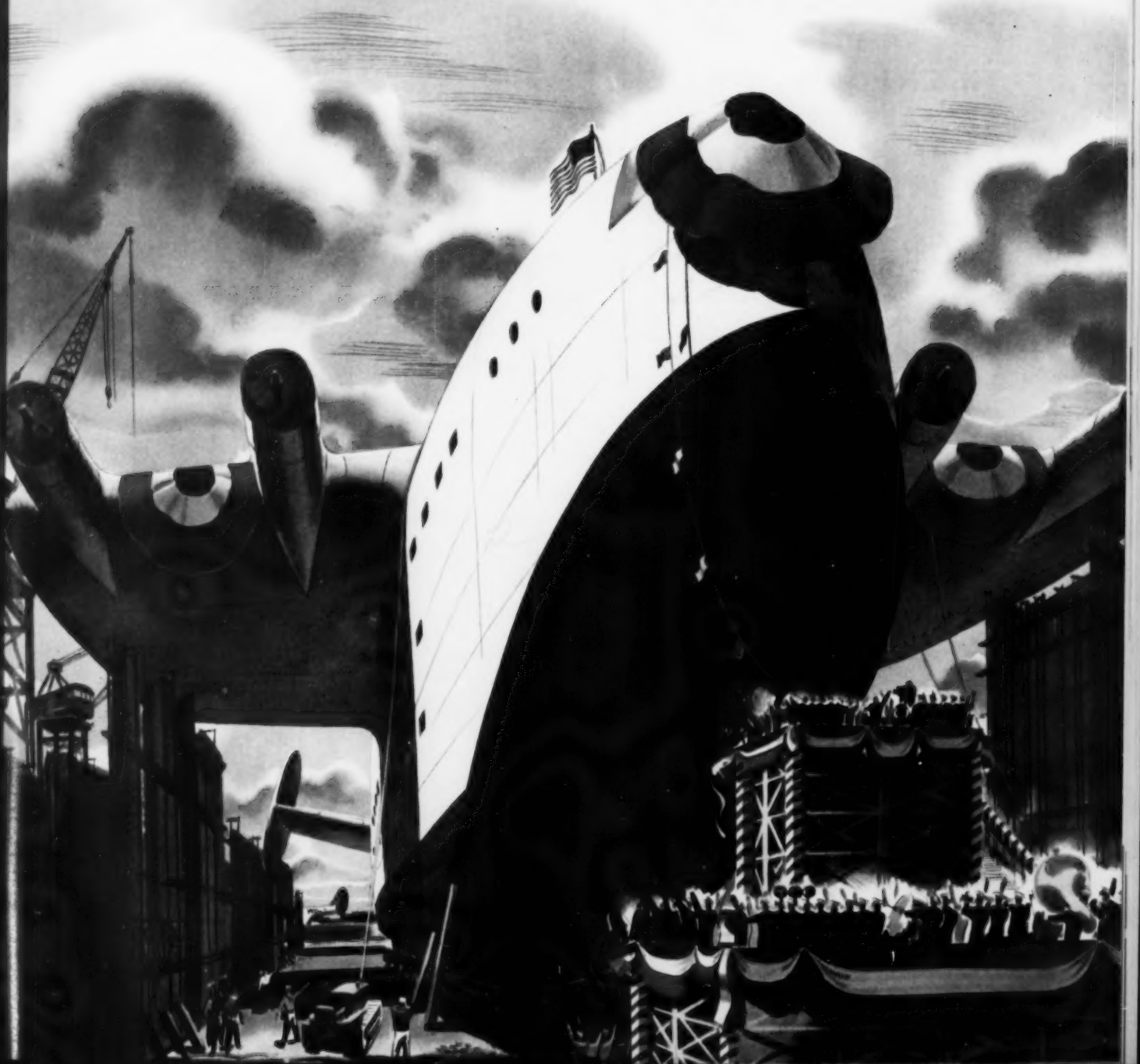

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AMERICA'S ONLY RADIAL AIR-COOLED DIESEL ENGINE

Ten years ago the first Guiberson-powered plane took to the air and the first ATC certificate for the Guiberson radial diesel engine was granted. Today, it is the only engine of its kind in the nation. It provides dependable, low-cost, fire-safe power, not only in planes but also in tanks which are on the fighting front. And in the field of post-war transportation it will win leadership for America—in the air, on land and on the sea.

America's top aircraft manufacturers rely on GUIBERSON for precision-built cowling, exhaust manifolds, intake manifolds, baffles and other vital parts

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GUIBERSON DIESEL ENGINE COMPANY

GUIBERSON CORPORATION
AIRCRAFT AND HEATER DIVISION
Dallas, Texas

Southern Flight

The only complete monthly digest of aeronautics in the South and Southwest

NOVEMBER, 1942 VOL. XVIII, NO. 5

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AMERICA NEEDS PILOTS!

Learning to fly is one of the finest ways in which you can help your country and yourself! America needs pilots NOW to help win the war . . . and she needs them for the future to carry on the great aviation industry that peace will bring.

Prepare yourself for a place in military aviation by learning to fly today! Take your instruction in the famous Piper Cub Trainer . . . the plane in which thousands of Uncle Sam's pilots received their initial instruction . . . the plane that is daily starting eager fledglings on the way toward winning their wings in our armed forces.

Flying is a not a skill reserved for the chosen few. Whether you are sixteen or sixty . . . if you are in normal health and possess normal judgment . . . you can learn to fly with as little as eight hours of dual instruction in a Piper Cub!

Contact your Piper Dealer . . . ask him for a flight demonstration. Get started on a career in aviation . . . a career that will help your country now and offer unlimited opportunities for your future.

FREE BOOKLET ON HOW TO FLY. Send today for your copy of the easy-to-understand booklet "You, Too, Can Fly!" If you also want the full-color Piper catalog, enclose 10c in stamps or coin for postage-handling. Piper Aircraft Corporation, Dept. SF112, Lock Haven, Penna., U.S.A.

PIPER POINTS THE WAY TO WINGS FOR ALL AMERICA

The Eagle Strikes

The American Eagle, when aroused, is a sudden whirl of fury as it strikes with killer claws.

The American people and their government are fully, fiercely aroused today. They are fighting this toughest of all wars with every nerve and sinew . . . ready to wreak destruction on the enemy.

The Army Air Transport Command, The Naval Air Transport Service, and The United States Maritime Commission have organized and are directing the most gigantic transportation job in world history. Due to their combined efforts, the greatest fleets of aircraft and ocean-going vessels ever assembled are now operating to all corners of the globe — on a scale that defies imagination.

American Export Airlines and American Export Lines, with giant four-engined flying boats and new fast cargo ships, are doing their bit in this gigantic transportation effort.

American Export *Lines Airlines*

25 BROADWAY, NEW YORK

REVVING UP

MISSING IN ACTION: When Eddie Rickenbacker went down in the Pacific early in the night of October 21, he was a civilian, but he was in action against the enemy just as if he wore the tunic of the Army Air Forces. He would have donned insignia but for the serious injuries suffered in an EAL accident last year. Rick nevertheless was enlisted as confidential adviser to the Secretary of War and, true to the form of the ace he was, he was bound for the front when fate overtook him. That's how he will always be remembered — missing in action.

★ ★ ★

VALUABLE LAGNIAPPE: We've been working nights writing thank-you notes to Civil Air Patrol leaders who have praised our handy CAP Handbook. And we've still got a lot more midnight oil to burn before we're through. The Handbook is a loose-leaf binder, which we give free with a one-year subscription from CAP members. It is a storehouse for official and codified training and operations directives we publish every month. Each of the Wing Commanders has our CAP Handbook. So do hundreds of other members.

Major Earle L. Johnson, National CAP Commander, writes:

"I appreciate very much receiving the CAP Handbook and want to commend SOUTHERN FLIGHT very highly for their initiative in sponsoring this very worthwhile service. I sincerely hope that every member of Civil Air Patrol will avail himself of an opportunity to secure this service."

Major D. Harold Byrd, Commander of the Texas Wing, says:

"In my opinion every CAP member will benefit by having a copy available for personal use at all times."

Other Wing Commanders have been equally quick to praise our CAP Handbook. The following are excerpts from unsolicited letters:

"I have received a copy of SOUTHERN FLIGHT'S Civil Air Patrol Handbook, and wish to compliment you very highly in having put out this book. It will be very helpful to various units of this Wing, and we will advise our unit commanders that they can obtain copies of the book by communicating with you."

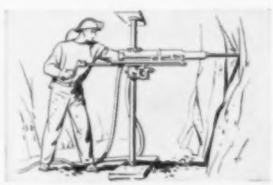
"Enclosed is my check for $2.00 for a year's subscription to SOUTHERN FLIGHT. This is a most worthwhile service you are rendering to CAP."

"You may rest assured I will mention this Handbook at our Group meeting tomorrow, as I think it is an excellent idea and gives the members a fine record of directives."

CLEVELAND PNEUMATIC PRODUCTS

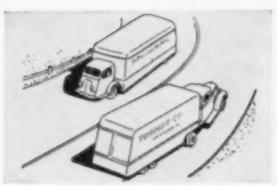
serve from the mines to the flying fields!

In the production of Cleveland Pneumatic Aerols*, which keep 'em landing safely and smoothly, all of the other Cleveland Pneumatic products play an important part.

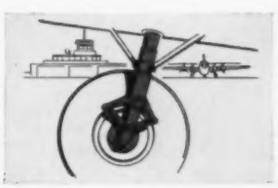


MINING. The first step occurs underground where Cleveland rock drills help extract the iron ore as well as the other minerals used in Aerols.

METAL WORKING. Later, Cleco pneumatic tools, such as chippers and grinders, aid in finishing the metal forgings from which Aerols are made.



TRANSPORTATION. Cle-Air shock eliminators help speed deliveries on many trucks transporting the raw materials and the parts for Aerols.



MANUFACTURING. Finally, at our own huge plant we manufacture the world-famous Aerols which are supplied for all types of airplanes.

Thus, from the mining of the metals to the time when the plane lands on Aerols, Cleveland Pneumatic products contribute to aviation's progress. The Cleveland Pneumatic Tool Co., Cleveland, Ohio.

AEROLS*

*THE SHOCK ABSORBING UNITS ON AN AIRPLANE'S LANDING GEAR; THE NAME IS DERIVED FROM THE WORDS "AIR" AND "OIL"—THE FLUIDS USED TO DISSIPATE THE LANDING SHOCKS

The Birdmen's Perch

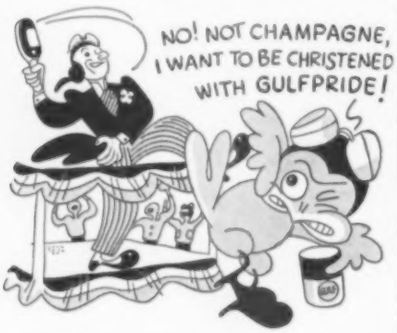
THE NAMES FOR OUR Canary Commando were wonderful, gang!

We wish we had a dozen Oily Boids so that we could call them "*Blunderbird*," "*One Wing Low*" and "*Rudderduck*."

And even Oily howled at "*Luberator*" and "*PB ½*."

He didn't seem to like "*Gasolini*" or "*Burblebird*" or "*Airacoma*"—but we did!

But the life-size portrait of Oily goes to a girl! Mary Bennett, of Englewood, N.J. sent in the name we liked most... the name that most perfectly describes our 4-F Fowl.



Perch Pilots, meet "*FLUTTER*," the Oily Boid.

Major Al Williams

alias, "Tattered Wing Tips," Gulf Aviation Products Manager, Gulf Bldg., Pittsburgh, Pa.

BRAINTWISTER

A pilot had to fly from Pittsburgh to Detroit on business. He left home in the morning accompanied by his wife, who saw him off and waited at the airport until his ship was out of sight. He flew to Detroit non-stop, and the first person to greet him was his wife. She'd not travelled by train, road, or plane. How did she get to Detroit?

When you send your post card for the answer, send us your brain-twister, too. Complete with answer, please.

SOME-DIAL!

You Perch Pilots who fly twin-engine jobs will soon find it much easier to check your instruments.

A new whingdinger of an instrument combines the readings of three instruments (2 tachometers and a synchroscope) *on one dial*. You get an rpm reading on BOTH engines and see how much out of synchronization they may be at a glance. Removing the two unnecessary dials disposes of deadweight, and the remaining dial does more work.

Lubricants refined by old-fashioned methods had parts which made sludge and parts which formed carbon—in addition to the part which did the actual lubricating. To get rid of these unnecessary parts of petroleum, Gulf engineers devised the Alchlor Process, which removes *more* of these two deadweights from Gulfpride. And the remaining oil does more work.

Better try it.

POWER OF THE PRESS DEPT.

It's been some time since we felt obliged to open the musty doors of our POTP Dept.

But we'd like to remind you of a letter from "Great Circle" Gribbin, in July's Perch. Part of his whopper said, "*A while back you mentioned a tailless plane without a fuselage. It seemed like the wrong approach to a good idea. A wing is bound to contribute to drag. I tried to solve the problem of drag in a different way. I made a tailless plane without a* wing."

Now read this, from a recent newspaper:

"A wingless airplane dubbed the 'Flying Flounder' has been successfully flown more than 62 times by its inventor. The plane looks like an elliptical pancake and does 190 mph."

Well—?—

Bet he used Gulf Aviation Gasoline, too.

Gulf Oil Corporation and Gulf Refining Company... makers of

GULF **GULF AVIATION PRODUCTS**

OIL IS AMMUNITION—USE IT WISELY!

ALWAYS TIE A WARNING TAG TO THE THROTTLE OF A PLANE THAT IS NOT...
...IN FLYING CONDITION, ESPECIALLY IF THE PLANE IS "ON THE LINE" WHILE...
...UNDERGOING REPAIRS OR ADJUSTMENTS, AND...
PUT A TAG ON YOUR GAS ...TANK, SAYING...
NOTHING BUT THAT GOOD GULF AVIATION GASOLINE PLEASE!

Dive Bomber—?

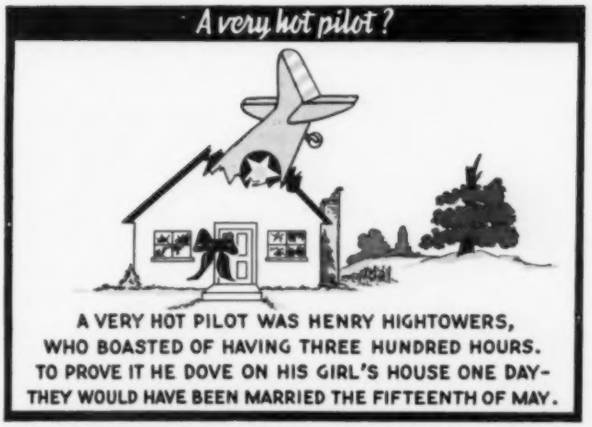
19 years of technical skill and engineering ingenuity are built into the Consolidated PBY patrol bomber . . . the Catalina.

We think she's the finest plane of her type in the world. But even with our intimate knowledge of her ruggedness and fine design, we were unprepared for a recent message that came in from "Down Under":

"Catalinas have actually engaged in dive bombing, in defiance of their designer's aims!"

. . .

Consolidated Aircraft Corporation, San Diego, California. Member, Aircraft War Production Council, Inc.


A very hot pilot?
A VERY HOT PILOT WAS HENRY HIGHTOWERS,
WHO BOASTED OF HAVING THREE HUNDRED HOURS.
TO PROVE IT HE DOVE ON HIS GIRL'S HOUSE ONE DAY—
THEY WOULD HAVE BEEN MARRIED THE FIFTEENTH OF MAY.

Reproduced in the interest of safety, by permission of the Army Air Corps.

CONSOLIDATED* builds Battleships of the Air

*Originator of the LIBERATOR . . . CATALINA . . . CORONADO

Just Among Ourselves

REVISING THE AIR SAFETY RULES

It now appears that the collision of the American Airlines airliner and an Army bomber was to some degree a premeditated meeting, and that weather conditions, inexperience, or poor judgment—or more likely still, a showoff attitude—caused a serious accident resulting in the death of all the passengers and crew of the airliner.

This was not an airplane accident —nor was it a failure of the rules or regulations governing the flights of aircraft. It was, rather, the same old story of *failure of individuals to abide by the existing rules.*

Whenever an individual takes chances with the lives and property of others, in direct violation of many existing rules and regulations, then it is the fault of the individual—not of the system. We have many instances of this sort and there are no means available for examining individuals and forecasting when they may decide to do something foolish. Very few individuals have published books telling of their wild plans—in advance. Such a person was Hitler.

Some ideas we have picked up indicate that in general the greatest disregard of rules and regulations is to be expected from younger pilots. The Air Forces at present are largely composed of such young fellows—and we depend, in fact, upon the foolhardiness of them to cope with the fanatical Japanese. Thus, it appears that what we need now is not a whole flock of new rules—but a program of instruction—by the Air Forces—to impress the Army's younger pilots with the necessity of abiding by the existing rules.

No record of safety was ever set up by any means of transportation that has been even *one-third* as impressive as the safety record for air transport during the year 1940. The record was something like one billion and a half passenger miles per fatality. This record, and many other impressively safe ones, were flown under the continuously improved regulations of the CAA. We have already been pleasantly impressed that the Air Forces have adopted the regulations of the CAA (CAR) and do most of their cross-country flying by those regulations. We are also pleased that the Air Forces have impressed into their service some of the very men (from the CAA) who have been responsible for the building of the safe flying records already mentioned.

The Air Forces are trying their best to improve their record of safety. They are not, perhaps, receiving all the co-operation from their young pilots that they should. But what else can we expect? At any rate, we'll bet if the figures could be made available, that the Air Forces have flown a tremendous number of hours —with an enormous number of inexperienced men—and that, under such conditions, their record is not so bad. Since they *are* trying to improve it, by already proven methods, inexperienced legislators should keep hands off.

What Is CAP Doing?

Nobody knows much about them. They're just some of the boys at the airport and they wear khaki clothes with red trimmings, propeller buttons and an alphabetical "CAP", which could mean "Civil Air Pilot" or "Civilian Aviation Patrol".

Nobody knows exactly what they're doing, but some of them have mentioned coast patrol now and then at the office, with a hush-hush.

Nobody knows what's happened since, although the papers haven't had any more to say about folks on the beach watching ships burn to the water a few miles out. And the general up East hasn't put out any more communiques for the Civil Air Patrol.

Nobody knows.

Because of this the American public is ignorant of one of the greatest dramas ever performed. They argue about the intangibles of bombers and fighters and flying freighters, while a lot of put-putts are winning an edge of their own over the enemy's biggest threat yet levelled against the homeland. They know more about the new pipeline from Longview, Texas, to the East than they do about the hundreds of civilian volunteers who trained themselves after office hours and took up unceasing vigil over our coasts.

It's high time the public was informed by those in authority.

We can build a civil defense air force of many thousands of men and women and equipment if we call in the public. And we can build morale among the military services. Recently a Cleveland CAP member received from his son who is in the Army Air Forces a letter which makes the point for us. It said: "I wish you were here to see the fine job the CAP is doing on the seacoast. Every time you look up you see a CAP patrol plane making a routine hop. You should feel very proud of being a member of that organization. In fact I am very proud of you myself."

The CAP is doing a fine job on our coasts.

But the public doesn't know it.

Let's Use All Facilities

Why not link together the facilities of engineering schools and aircraft production schools and thus utilize their equipment and, in some cases, their manpower, for war work? Such a program would benefit everybody.

We were in a large university's engineering laboratory recently and its vast and valuable collection of equipment was at a dead standstill except for periodic operation by students. Even when they used the machines, they weren't producing anything. Experience, yes. But it strikes us that the familiarity between student and machine could be made much more effective if essential war materials, whether they be small parts or subassemblies, were produced simultaneously with experience. The aircraft industry has simplified production methods to allow anyone with diligence and the equipment to turn out material of excellent quality.

In our school laboratories are all the essentials—diligence, equipment and supervision.

...dish it out!

In the skies...and from the skies... your warplanes dish it out, America! Your fighters...and your bombers...now sweep the skies they choose. They're blasting on the offensive...not taking it according to Axis schedule.

But at home, America...you've got to dish it out, too. In this fight, the pay-off is for dishing it out on *all* fronts of total war... everywhere.

America's planes have *quality*... and your flying forces are getting them in *quantity*. Backed up by a united, fighting America, they're a combination that can make inevitable the air mastery of the United Nations.

For this mastery, Lockheed builds the P-38 Lightning, the world's fastest two-engine fighter...*officially*...and the Lockheed Hudson bomber. Lockheed Aircraft Corporation...Vega Aircraft Corporation...Burbank, California.

for protection today, and progress tomorrow, look to

Lockheed

FOR LEADERSHIP

What's all this talk about Altitude?

Aircraft have missions to perform at *various* altitudes.

All military aircraft are designed to give their best performance at some SPECIFIC altitude.

If it's WAY UP you are talking about, up as high as a fighting plane of any nation has ever sought or met an enemy, that's as much HOME as any other level to an Allison engine.

For the Allison engine, combined with the turbo-supercharger, is the power that makes the Lockheed "Lightning" (shown above) the world leader at the highest altitudes at which planes fight.

And when comparing American fighting planes with foreign competition, don't forget that the American ships carry more weight because of their superior protective armor, heavier fire power, longer range and better instrumentation.

LIQUID-COOLED AIRCRAFT ENGINES

Allison

DIVISION OF GM GENERAL MOTORS

...and a HELLDIVER it is!

When, in 1928, Curtiss-Wright built the first carrier-based Navy airplane designed specifically for dive-bombing, its then sensational ability inspired the name, "Helldiver."
Today's Helldiver, the new SB2C-1, more than ever justifies its name—for its flashing speed and the greater destructive power of its heavier bomb load and deadlier armament have won the rating of "world's best" in the judgment of impartial authorities.

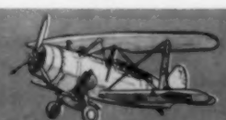
SECOND PRINTING: Send 10¢ for your copy of this fascinating 96-page history of aviation by Assen Jordanoff, author of "Your Wings", with illustrations of current fighting types. Airplane Division, Curtiss-Wright Corp., Buffalo, N. Y.

CURTISS-WRIGHT
Corporation
AIRPLANE DIVISION

FIRST
Since the Birth of Aviation

1928 • First United States Navy Airplane built specifically for dive bombing tactics and carrier operation. Two fixed guns in upper panel and a rear swiveling gun completed the armament.

1933 • Further streamlined, using a twin-row radial engine for higher performance, the now famous Curtiss Helldiver was in use by both the United States Navy and Marines.



1937 • Many squadrons of these high performance SBC-3 dive bombers with heavy defensive armament and completely retractable landing gear saw service in the United States Fleet.

1939 • The SBC-4 powered with a Wright Cyclone, superseded the earlier type and excelled in performance. Planes of this model were still being delivered to the Navy in 1940.

Awarding Wings to Army Air Cadets

YOUR SON MAY BE our Boss

Somewhere high above a frenzied field of battle is the rhythmic roar of open throttles—the muffled sound of guns and cannon. Like miniature models, in a distant sky, a squadron of Army P-39 Airacobra pursuits piloted by American Youth battles it out against the enemy.

These are the battles for which we build. Battles that are our inspiration to make every Airacobra we build one of the world's most deadly single-engine fighters. We keenly feel the responsibility that rests upon us.

The success of our Army Air Force Pilots and every man in our fighting services depends upon mastery of the air. We at Bell Aircraft are serving these men with every ounce of ingenuity and skill at our command. They are entitled to our greatest efforts. *They* are the men for whom we work.

Among the millions of boys now serving in the fighting forces of our country you may have a son. It is our duty to serve and protect him. We are doing it by providing the mightiest weapon we know how to build. We are proud to have him as our boss.

And we shall be proud to keep him as our boss. For tomorrow, when victory is won these men and boys now in service will return to their places in industry and commerce. We look forward to serving them with the planes of peace in a new world of advanced aviation. © Bell Aircraft Corporation, Buffalo, New York.

Airacobras for victory—

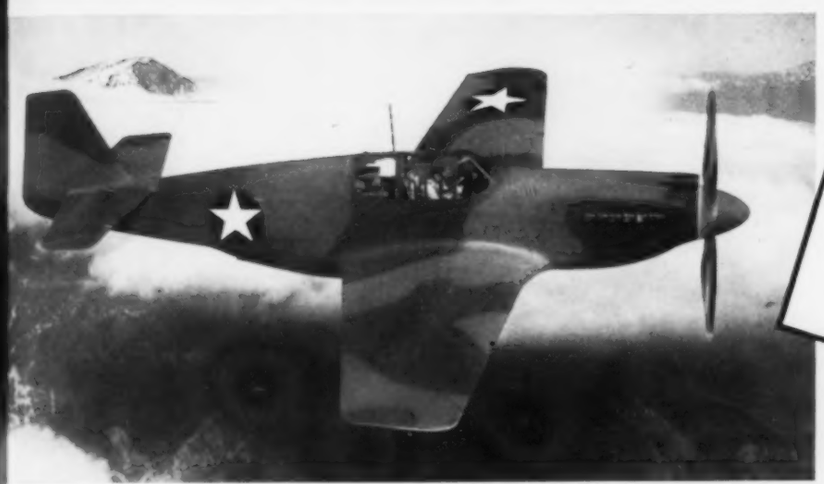
FUTURE PLANES FOR PEACE

BELL *Aircraft*

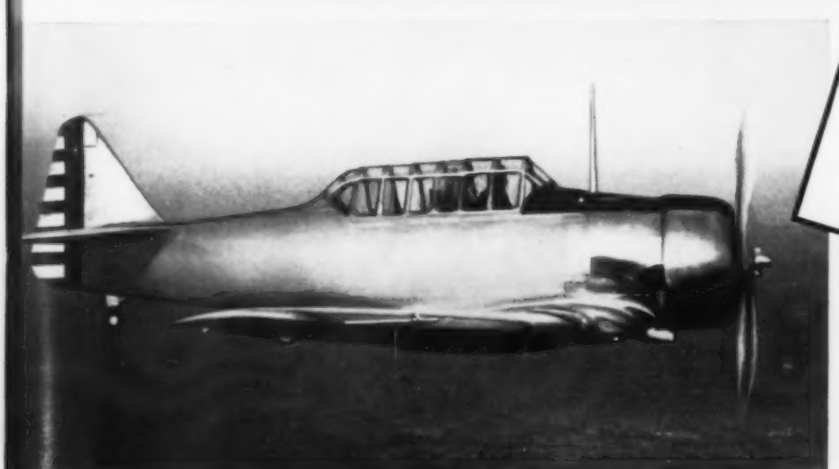
PACEMAKER OF AVIATION PROGRESS

Design for Victory

From Southern California come North American B-25 bombers. This is the type of bomber which first blasted Tokio.



From Southern California come North American Mustang fighters . . . dread scourge of the Axis Nations the whole world over.



From another NAA plant come North American trainers . . . in which United Nations pilots earn their fighting wings.

Thousands of these bombers, fighters and trainers are the contribution of North American Aviation employees.

NORTH AMERICAN AVIATION, INC., Main Plant, Inglewood, Calif.
Member, Aircraft War Production Council, Inc.

NORTH AMERICAN *Sets the Pace!*

Whether you were involved or not, study these official figures and observations on the 4,252 non-carrier accidents in aviation last year. Poor technique has caused too many crashes.

Analyzing ACCIDENTS

By THE SAFETY BUREAU
Civil Aeronautics Administration

DURING the calendar year 1941, 4,252 accidents occurring in non-air carrier flying were reported to the Safety Bureau. This is an increase of 781 over the accidents reported for the previous year, 1940. However, during 1941 the average number of certificated pilots and student pilots increased to 175,828 as compared with 107,952 for 1940. Based on this average number of pilots and student pilots, there was a reduction of approximately 25 per cent in the accident ratio in 1941 as compared to 1940. But the most encouraging fact disclosed in this report is that in spite of this considerable increase in flying during 1941, there were sixty-five fewer fatal and serious accidents, a reduction of 15 per cent in number and a reduction in the accident ratio of 50 per cent.

Admittedly, it would be more accurate to base the accident ratio on the number of hours flown rather than on the number of certificated pilots and student pilots; however, it is impossible to obtain an accurate figure for the number of flying hours in miscellaneous flying. It is felt, therefore, that the number of accidents occurring among a given number of certificated pilots and student pilots serves as an indication of trends, and it is encouraging to find this accident trend definitely downward during the entire year of 1941.

Table I shows the injury by kind of flying. Propeller accidents are shown separately from kinds of flying because it is often impossible to tell what kind of flying has been done or is contemplated when a person is struck by an idling propeller. The column headed "Ratio x 100" is the per cent of certificated pilots and student pilots involved in accidents multiplied by 100 in order to make a more readable and more easily comparable figure. For example, the ratio x 100 of the fatal accidents in 1941 is 12.3 as compared with 21.5 for 1940. This would mean that in 1941, .123 per cent of the certificated pilots and student pilots were involved in fatal accidents while in 1940, .215 per cent were so involved. The 1941 improvement in accident ratio is equally apparent in Table II which shows the nature of accidents in 1941 compared to 1940. It should be noted that the spin-stall accidents and collision accidents show a very substantial numerical reduction in 1941 over 1940.

TABLE I
KIND OF FLYING

Class of Injury	Instructional	Pleasure	Commercial	Propeller	Total	Ratio x 100
Fatal						
1941	47	126	40	4	217	12.3
1940	55	138	39	....	232	21.5
Serious						
1941	47	74	18	17	156	8.9
1940	59	118	29	....	206	19.0
Minor						
1941	147	169	40	24	380	21.6
1940	119	124	29	....	272	25.2
None						
1941	1,814	1,321	363	1	3,499	199.0
1940	1,277	1,228	256	....	2,761	255.8
TOTALS						
1941	2,055	1,690	461	46	4,252	241.8
1940	1,510	1,608	353	....	3,471	321.5

*Average number of Certificated pilots and student pilots in 1941 is 175,828; the average number for 1940 is 107,952.

These accidents have a very high ratio of fatal and serious injuries and their reduction in number reflects directly in the reduction in fatal and serious accidents. Such a substantial reduction cannot be overlooked and is probably due to the excellent standards of instruction set by the Civilian Pilot Training Program.

Simulated Forced Landings

No comparison is shown between simulated forced landings for 1940 and 1941, because during 1940, the simulated forced landing accidents were not segregated as a group. The comparison between simulated forced landing accidents and actual forced landings for 1940 and 1941 has been shown in a separate report on simulated forced landing accidents. *(Southern Flight, September, 1942.)*

In considering the various kinds of accidents by kind of flying in 1941, it is interesting to note that landing accidents account for 59.8 per cent of the instructional flying accidents, 47.2 per cent of the pleasure flying accidents, and 40.1 per cent of the commercial flying accidents. Take-off accidents, on the other hand, are less

* AS USUAL
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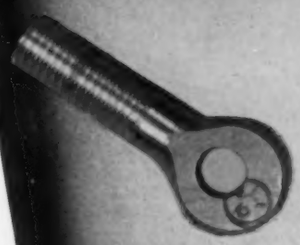
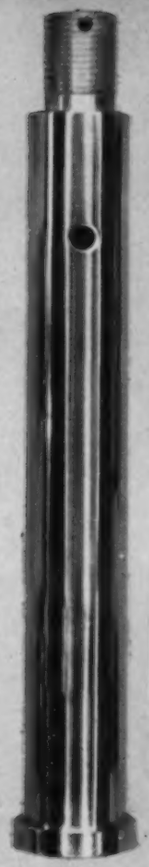
Precision has ALWAYS been a basic characteristic of the equipment E. L. I. builds. Today E. L. I. is doing the job we have always done — not for the Petroleum Industry, where E. L. I. Instruments and Equipment are in World-Wide use — but with the ability to do the job when the first requirement is precision, E. L. I. is achieving new production records in the manufacture of aviation products to help the United Nations finish the job!

IL BY-PASS VALVE



EYE BOLT

WING HINGE BOLT



LANDING GEAR HINGE BOLT

ELEVATOR CONTROL COLUMN ARM

Engineering Laboratories, Inc.

CONSULTING ENGINEERS & MANUFACTURERS

TULSA, OKLAHOMA, U. S. A.

QUIPMENT IN WORLD-WIDE USE

hroughout the past eleven years, E. L. I. as one of the largest geophysical research organizations in e World has contributed many instruments and developed services vital to the Petroleum Industry.

frequent in instructional flying than in pleasure or commercial flying. Spin and stall accidents and structural failure accidents also occur with less frequency in instructional flying. Collision with other aircraft occur with greater frequency in instructional flying, although collision with other objects occur with much less frequency in instructional flying than in pleasure flying, and in pleasure flying at about half the frequency of commercial flying.

Cause by kind of flying is found in Table III. As usual, poor technique is by far the greatest cause of accidents, and the personnel errors, poor technique, poor judgment and carelessness account for neary three-fourths of the total number of accidents.

In instructional flying, nearly 60 per cent of the accidents are caused by poor technique; in pleasure flying, poor technique accounts for approximately 40 per cent while in commercial flying, it accounts for only about 25 per cent. Poor judgment, however, accounts for only about 5 per cent of the instructional flying accidents and approximately 14 per cent of both pleasure and commercial accidents Carelessness is distributed practically evenly among all three kinds of flying with pleasure flying being slightly high and commercial flying being slightly low. Power plant failure is the cause of approximately 12 per cent of the instructional flying accidents, 17 per cent of the pleasure and 20 per cent of the commercial. As might be expected, accidents which occur most often in cross-country flying, for example, terrain, weather and wind accidents are most frequent in commercial flying and least frequent in instructional flying.

Nearly 65 per cent of the landing accidents are caused by poor technique. Carelessness is the second highest cause of landing accidents with approximately 12 per cent, and judgment third with more than 7 per cent. In the case of spin-stall accidents, 78 per cent were due to poor technique, 11 per cent to poor judgment and only 3 per cent to carelessness. All of the accidents in which there was a collision with other aircraft were charged to carelessness. In the case of collisions with other objects, however, judgment was the greatest cause, with carelessness second, and poor technique, third. As might be expected in the case of forced landing accidents, the greatest cause was power plant failure. In the case of simulated forced landing accidents, nearly 40 per cent were caused by poor technique, carelessness was second with nearly 30 per cent, poor judgment was third with about 15 per cent, and power plant was fourth with approximately 13 per cent.

TABLE II

NATURE OF ACCIDENT	1941 (175,828) Total Number Accidents	Ratio x 100	1940 (107,952) Total Number Accidents	Ratio x 100
Landing	2211	125.7	1513	140.1
Take-off	624	35.5	491	45.5
Spin-Stall	159	9.1	235	21.8
Structural Failure	79	4.5	53	4.9
Collision (other aircraft)	14	.8	31	2.9
Collision (other objects)	91	5.2	106	9.8
Forced Landing	574	32.6	537	49.7
Simulated Forced Landing	132	7.5	.....	.....
Taxying	257	14.6	437	40.5
Propeller	46	2.6	11	1.0
Fire	13	.7	17	1.6
Parachute	5	.3	6	.6
Other	47	2.7	34	3.1
TOTAL	4252	241.8	a/ 3471	321.5

a/ Total includes 41 simulated forced landings included but not counted as such in 1940.

TABLE III

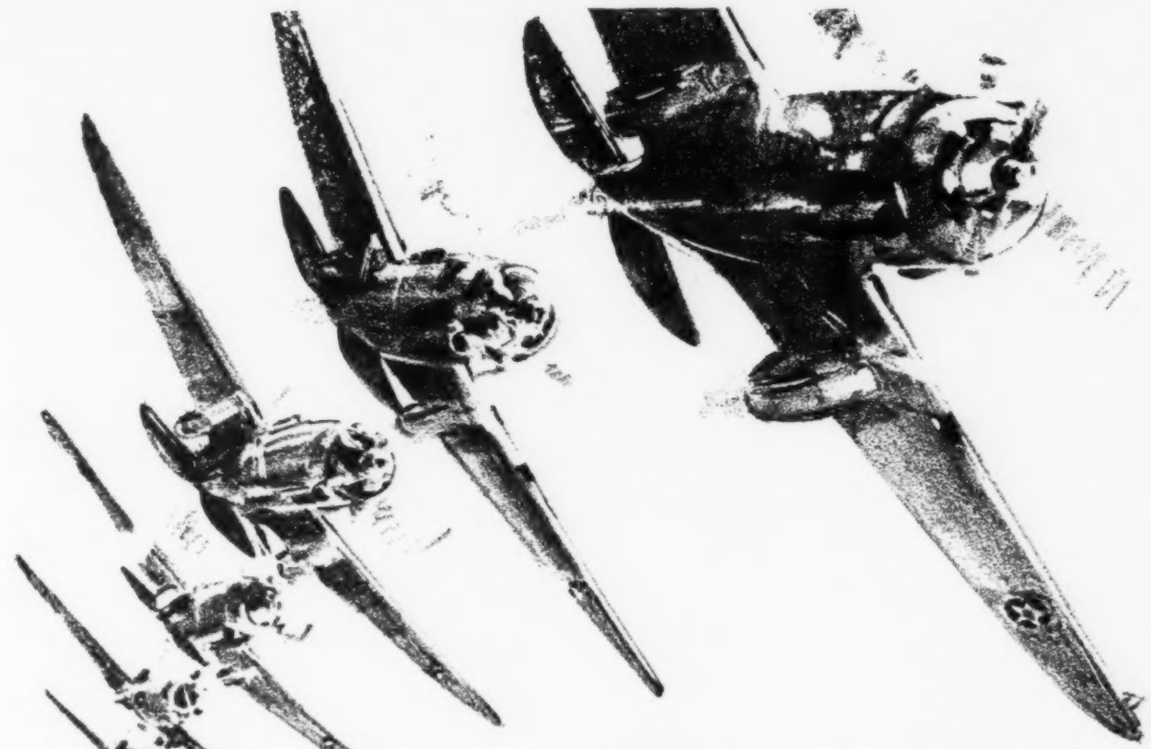
CAUSE OF ACCIDENT	1941 (175,828) Total Number Accidents	Ratio x 100	1940 (107,952) Total Number Accidents	Ratio x 100
Technique	1943	110.5	1441	133.5
Judgment	411	23.4	437	40.5
Carelessness	695	39.5	505	46.8
Structural Failure	195	11.1	177	16.4
Power Plant	642	36.5	468	43.3
Terrain	197	11.2	179	16.6
Weather	41	2.3	135	12.5
Darkness	4	.2	10	.9
Wind	21	1.2	18	1.7
Other	103	5.9	101	9.3
TOTAL	4252	241.8	3471	321.5

Student Pilots Carrying Passengers

In an effort to put an end to the hazard of student pilots carrying passengers, an educational campaign was inaugurated by the Safety Bureau and the penalties for this infraction of the Civil Air Regulations were made much heavier. These efforts have apparently had the desired effect, for during 1941 a total of forty-one accidents were reported in which student pilots were carrying passengers. Of these, twenty resulted in fatal or serious injuries. By way of comparison, in 1940, student pilots carrying passengers were responsible for fifty-nine accidents involving fatal or serious injury. During 1939, seventy-seven accidents were reported in which student pilots were carrying passengers and of these, fifty-five resulted in fatal or serious injuries. It is hoped that the reduction of this type of accident will continue at the same rate, for it will be noticed that a very high percentage, approximately 50 per cent, are serious accidents.

In considering areas in the United States, that area having the lowest accident ratio is a semi-circle around the Great Lakes taking in South Dakota, Minnesota, Iowa, Illinois, Indiana, Ohio, and Pennsylvania. Wisconsin, Michigan, and New York are definitely higher than these other states. The area having the next highest frequency extends approximately northeast and east from Texas through Louisiana, Arkansas, Mississippi, Tennessee, Kentucky, West Virginia, Virginia, North Carolina, South Carolina, Maryland, and the New England states. The Rocky Mountain states have the highest accident ratio. In an effort to determine whether the accidents in these Rocky Mountain states may occur chiefly to pilots from other states landing and taking off on high airports, a spot check was made in different states to determine what proportion of the accidents occurred to aircraft registered within that state as opposed to those occurring to aircraft from some other state. This check showed that approximately 25 per cent of the accidents within a state occur to aircraft registered from without. This ratio appeared to hold for any section of the country.

At first glance, it seems rather surprising that Alaska has a lower accident ratio than the Rocky Mountain states. This may be accounted for by the fact that comparatively few civil aircraft fly into Alaska from other states; consequently, the proportion of accidents normally occurring to out-of-state aircraft is lacking in this case. Many aircraft which do fly into Alaska from outside are of Canadian registry and, therefore, the Safety Bureau would not be notified in case of accident to such aircraft.



HUMBLE-ESSO AVIATION PRODUCTS

Flyers and Fuels

that are Tops

Man for man, American Fliers have proved themselves superior to the most seasoned pilots the Axis can send against them. Gallon for gallon, American made Aviation gasolines also have demonstrated their superiority to the most potent *ersatz* fuels. Because this is true — because there are men to fly them and fuels to power them, there will come from the assembly lines of American plants superior planes that shall blast the Axis from the face of the earth.

Humble-Esso Aviation Products will have a part in that great accomplishment because they are already in the thick of the fight. Producing Humble-Esso Aviation Gasoline and Humble-Esso Aviation Oil is part of the war job to which Humble is dedicated — there will be no let-up until Victory is ours.

HUMBLE OIL & REFINING COMPANY

13,000 Texans United in the War Effort.

Where every POUND of fuel counts...

OVER increasingly greater distances each succeeding day range big American bombers. In spite of rough weather and adverse winds, objectives *must* be reached. From every pound of fuel the pilot must extract every ounce of power. Hence the use in long-range craft of the "PIONEER" Fuel Flow Meter. This high-precision instrument tells the pilot at all times the *exact* rates at which his motors consume fuel . . . enables him to adjust each mixture control for maximum operating efficiency.

Like all "AUTOSYN"- actuated "PIONEER" instruments, the Fuel Flow Meter is remote indicating. No fuel lines enter the cockpit. Mounted in the engine nacelle, the flow metering unit transmits its indications electrically to the "AUTOSYN" Indicator in the panel. Other "PIONEER AUTOSYN" systems, contributing to better flight equipment for the world's best pilots and aircraft, provide remote indication of many engine functions, fuel level, oil or coolant temperature, flap and retractable gear positions.

"PIONEER" Fuel Flow Meter, which gives pilot continuous reading in pounds per hour for each motor. One dial on two-motor planes, two on four-motor.

Products of the Pioneer Instrument Division are important members of "The Invisible Crew," which 25 Bendix plants from coast to coast are speeding to our fighting crews on world battle fronts.

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PIONEER INSTRUMENT DIVISION

Flying [redacted] Men, [redacted] Jeeps at [redacted] Miles per Hour

-and each "Scintilla" Aircraft Magneto delivering [redacted] timed sparks per second

Military secrets are the speed and carrying capacity of the new Curtiss Commando. Not so secret is the knowledge that this transport airplane can land a unit of aggressive and resourceful fighters complete with their special cars and weapons, near vital combat zones.

Carrying a cargo of this size and importance places extra stress on the dependable ignition furnished to the engines of these transports by "BENDIX-SCINTILLA" Aircraft Magnetos. Like "BENDIX-SCINTILLA" Spark Plugs, Switches and radio shielded Ignition Harnesses, the Magneto that delivers controlled lightning in all kinds of weather is built in a variety of types to give the best aircraft ignition to the world's best military transport and private pilots.

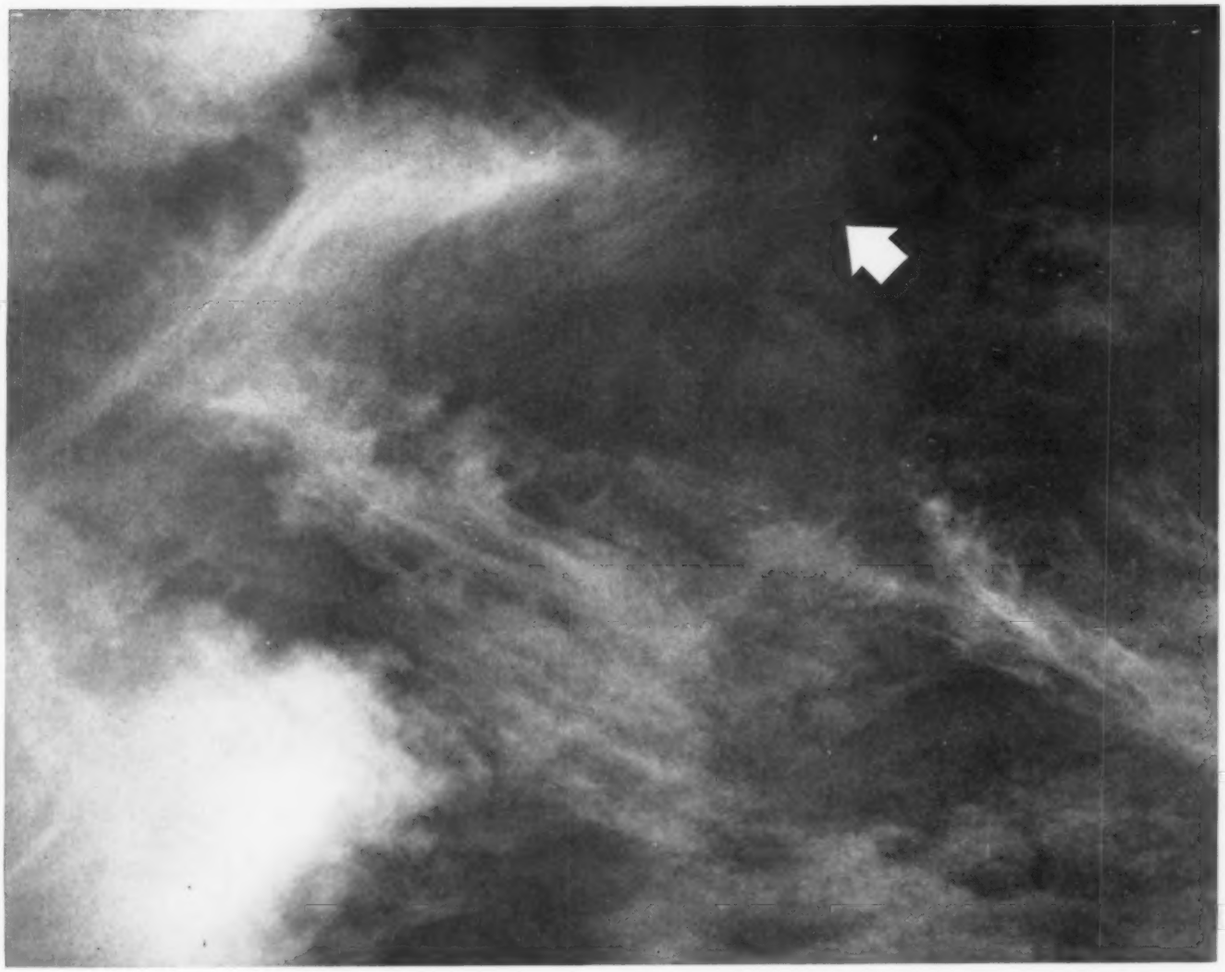
"BENDIX-SCINTILLA" Aircraft Magnetos, Switches, Spark Plugs and Ignition Harnesses are important members of "The Invisible Crew," which includes the precision equipment and accessories built by 15 Bendix Divisions, and serving with our fighting crews on every front.

THE INVISIBLE CREW

Precision Equipment by Bendix AVIATION CORPORATION

BENDIX SCINTILLA

THE WORLD'S FINEST AIRCRAFT IGNITION



Photograph of a Flying Fortress—seven miles up

This is the way a Flying Fortress* looks to the enemy, on its way to the bombing objective. At six and seven miles up, an airplane is invisible to the naked eye, and one of the reasons for the success of the Flying Fortress in combat is that it strikes with deadly precision from regions above the effective range of anti-aircraft fire, and beyond the reach of most enemy planes.

Seven miles is 36,960 feet. Problems of flight that high in the air increase in severity with every hundred feet. The air up there is colder than Siberia in winter, and atmospheric pressure falls off sharply. The stratosphere is still a newly discovered country. Until recently, one of the major problems has been the maintaining of communications.

A year ago 19,000 feet seemed to be the ceiling for plane-to-ground voice communication. Above that, somewhere in the thin, biting air of the substratosphere, the radio-telephone died. Radio-telegraph was good up to 26,000. From there, it was a one-way street. You could receive, but you couldn't send.

Here was a problem for Boeing acoustical and electrical engineers. Years ago, in the early days of air transport, Boeing led the development of the first plane-to-ground short-wave radio-telephone system. Now, with Boeing Flying Fortresses operating six, seven and more miles above the earth, it was necessary to provide two-way radio voice communication at these levels.

This the Boeing engineers did.

Working nights and days, working in the laboratory and "upstairs" in the stratosphere, working against time and cold and rarefied air, Boeing engineers have gradually pushed the communications ceiling higher and higher.

Today the men in the Fortresses, cruising over the roof of the world, know that their communications system is the best available. . . . Today the work of Boeing engineers is helping our Air Forces to speak terse, well-chosen words for democracy.

The advance of radio communication . . . both for peace and for war . . . is only one of the many different projects which form a constant part of the Boeing engineering schedules at Seattle and in the Middle West and Canada.

DESIGNERS OF THE FLYING FORTRESS • THE STRATOLINER • PAN AMERICAN CLIPPERS **BOEING**

*THE TERMS "FLYING FORTRESS" AND "STRATOLINER" ARE REGISTERED BOEING TRADE-MARKS

HOW THE AVIATION INDUSTRY CAN FURNISH BOMBS AS WELL AS PLANES

THERE'S a bomb in your cellar or attic. No, it doesn't look like a bomb. Right now it's broken garden tools . . . discarded toys . . . worn-out pots and pans . . . junk. But every piece of scrap will make twice its weight in fighting equipment . . . 100 pounds of scrap will furnish basic metal for a bomb big enough to sink a destroyer. Get those bombs out of your cellars today, and the planes we're all building will deliver 'em to the Axis!

When You Quit Work Today, Do This

If you live at home, get busy and collect all the scrap you can find. You'll be surprised to see just how much you have on hand. Then call a junk dealer, or your local scrap collection agency. If you don't know where to get in touch with the scrap collection agency, call your local newspaper and they'll tell you.

If you live in a boarding house or apartment, team up with the other folks in the house. Offer to do a clean-up job for the householder and dig out all the scrap.

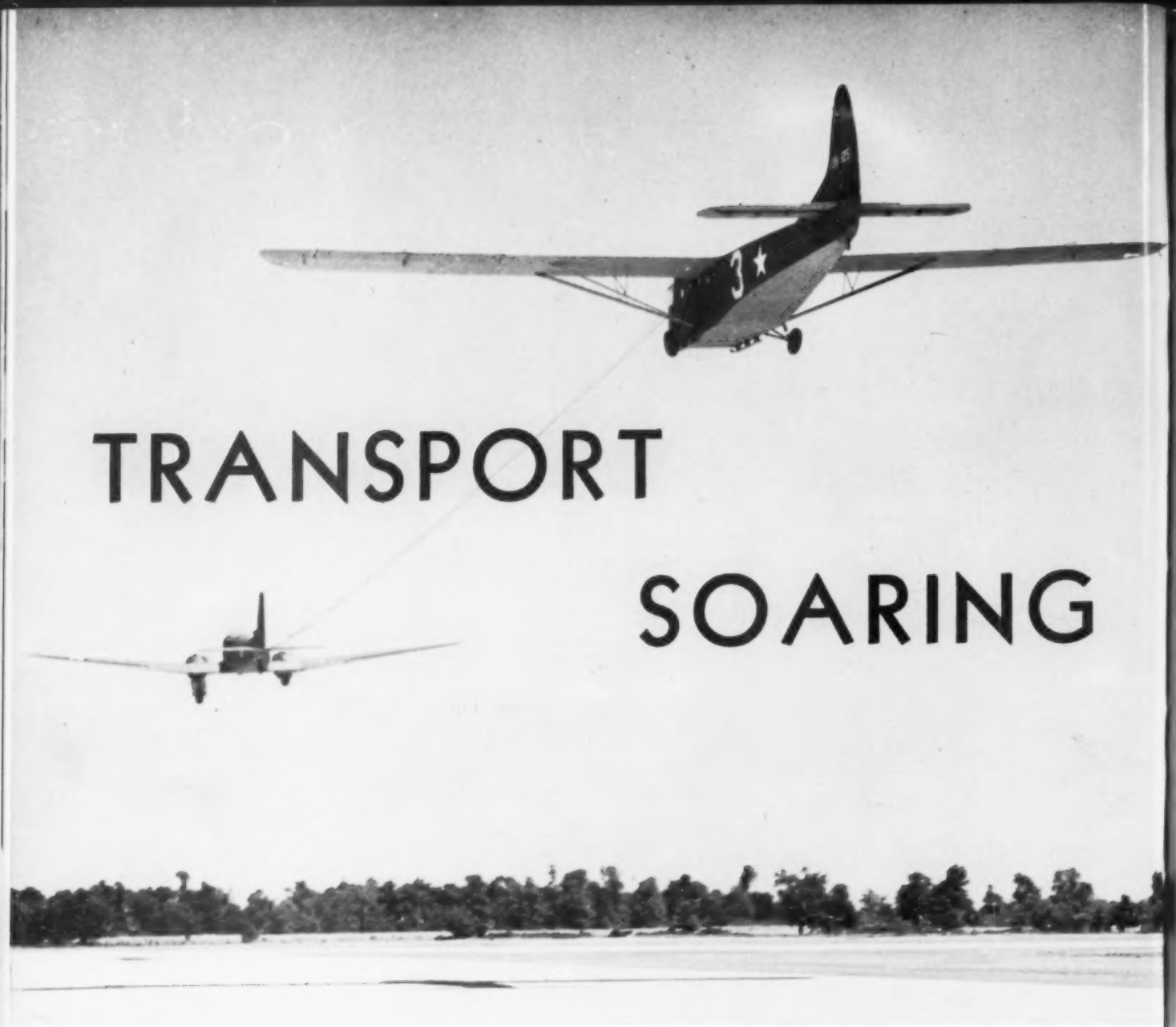
If you have folks back home, write today and tell them to get their scrap into action . . . *quick!* America must have scrap!

What the Aircraft Industry Can Do

Employment figures for the industry are secret. But there are certainly upward of half a million employed. And if each family of half a million aircraft workers were to collect the national family average of 104 pounds of scrap, it would add 50 million or more pounds to our war effort . . . enough to blast Hitler, Tojo and Mussolini straight to hell. And the only cost is an hour or so of our time! That's not asking much when we know what our friends, brothers, sons and husbands are up against *out there.*

How about it, aircraft men and women? Let's stop "letting George do it." Let's do it ourselves . . . TODAY!

Published in the interests of the National Scrap Salvage Drive by The Glenn L. Martin Co., Baltimore.



TRANSPORT SOARING

Army Air Forces

Army glider pilots have entered post-graduate work in Arkansas. Using the first batch of motorless transports off the assembly line, they're grooming for the heavy haul—fifteen troops to the glider, or four men and a jeep.

A HANDFUL of Army Air Forces officers stood on the white cement runway of a new Army air base at Stuttgart, Arkansas, looking toward the sky. Occasionally they glanced at one another, smiled and nodded. The Air Force, they agreed, was on the offensive. They were watching the maneuvers of a half dozen new cargo gliders—the first to be delivered for training to the AAF Flying Training Command.

Come along with us while we witness, with them, the premier performance of a potent new weapon.

Jeeps Hauled in Gliders

They're not beautiful, these mute birds of death—they are made of canvas and plywood and silk thread and aluminum braces. Most of their lines are at right angles, but what they lack in esthetic glamor is more than accounted for in utility.

These lumbering, ungainly sky monsters can transport fifteen men with full equipment, or they can carry a jeep and four men — ready for action. Two or three of them towed behind a single bomber, boosts the mother ship's cargo capacity as high as 100 per cent, from say 20,000 pounds to 40,000.

Lieutenant Chet Decker, youthful assistant director of training at this Flying Training Command School, stood at one side of the runway directing air traffic via three-way radio. With one compact little instrument

GROUND CREWMEN HITCH a tow rope to the nose of a fifteen-place glider for another flight. The 300-foot nylon rope stretches nearly 25 per cent when towing a partially loaded glider 120 miles an hour. Costing $150.00 apiece, each rope lasts for an average of seventy-five tows before being discarded.

about a third the size of your grandmother's telephone, he bossed half a dozen planes and as many gliders soaring overhead.

"Sure there'll be bigger ones," he smiled. "It's only a question of developing tug and tow with compatible flight characteristics." And in response to our puzzled expression, the blond veteran of some 600 gliding hours hurried to explain:

"You see, if the tow ship stalls at one speed and the glider at another, for example, they're not 'compatible,' and there is a good possibility of trouble." He picked up his mike again to bring one of the gliders down for the next student.

We walked to the far end of the sparkling white runway to a spot about thirty feet beyond where the powerful Douglas transports lifted their charges into the sky. The training in fifteen-place gliders at this Flying Training Command base is more or less a post-graduate course after the completion of primary instruction in small two-place jobs. The pilots here are taking a two-hour transitional course to become familiar with the peculiarities of transport soaring.

Let's Go Aloft

They took off and landed at intervals of ten minutes. From where we stood, we could see Lieut. Decker shout instructions as ground crews hustled to hitch the tow ropes, and pilots checked their ships.

Decker dropped his hand, and one after the other the transports came lumbering down the runway, their powerful motors churning the air in angry defiance of their added burden. Thirty feet from where we stood, trembling for fear they would rise too late, the giant planes lifted themselves gracefully into the air, their motors shaking the earth. At the end of a leash, the gliders came swishing on behind like whimpering children being dragged by impatient mothers through a bargain basement.

To take a hop in a glider is to sit in on a preview of the misfortunes in store for Hitler and his colleagues. We hitched a ride this afternoon with Lieutenants Carmel M. Slaughter and H. T. Bailey. They were sitting at the controls of their ship waiting for a tow when we poked our head through the door. Lieut. Bailey was reading a magazine as if waiting for the 5:15 instead of a tow plane.

"Has gliding already become this prosaic?" we asked.

"Naw, Bailey is just the kind of a guy who couldn't get excited with Rosalind Russell," Slaughter replied.

We thought that this was the kind of a pilot to have along in actual combat. Bailey was big and raw-boned and kind of handsome in a Texas cowhand sort of way. We sat down on one of the two plywood benches that extend half the distance of the ship on either side, and adjusted our parachute. The benches we observed could be removed to make room for cargo loads. The fuselage was composed of aluminum and plywood braces over which treated silk was stretched to the point where it "plunked" like a green watermelon when you thumped it. Portholes seven inches in diameter lined the walls. Up front the pilot's and co-pilot's compartment was not unlike that of an ordinary plane, except that there were far fewer dials and unfathomable gadgets. An air speed indicator, an altimeter, a compass, and one or two other nicknacks which the Air Force is keeping a secret was all there was to the glider's instrument panel.

TRAINING WITH TROOPS is done after gliders and pilots have been assigned to combat units. At schools of the Flying Training Command gliders are usually stacked with sand bags to give pilots experience in handling loaded ships.

EIGHT FIGHTING YANKEES finger their rifles as they prepare to take off in one of the Army's new fifteen-place gliders. Benches in the glider where the men are sitting can be removed to make room for a jeep.

FREED FROM ITS TOW-PLANE, the new U. S. Army glider soars leisurely through the sky at about eighty miles per hour. Normal rate of descent is about one foot in every ten feet forward. Under favorable weather conditions the huge motorless ship can actually gain altitude.

By now the tow plane had wheeled itself into position, and the ever-alert ground crew was hooking the tow rope to the nose of our ship.

Lieut. Bailey turned to make sure that we had adjusted our safety belt properly, and in a moment we were bounding down the runway like an excited ostrich. A hundred yards or so from the starting point, our wheels left the runway about the same time that the transport's tail lifted itself. We were perhaps fifteen feet above the ground before the tow ship picked itself into the air. The wind that whistled through the struts was almost as deafening as the roar of the C-47's motors ahead of us. Our air speed indicator registered 120 miles per hour. We had meant to ask Lieut. Decker some of the tricks of piloting a glider, but now watching Lieut. Bailey, the most important trick of all was instantly obvious. Every movement, every turn, and indeed it seemed at times, every thought of the pilot in the lead ship was echoed by Bailey. It was only his second hour behind the controls of a glider of this size, but he was performing like a veteran.

Quick Deceleration on Cast-off

In no time we reached the 2,000 foot mark, still gaining rapidly and still mimicking every movement of our mother ship. We flew about ten feet higher than the tow. That, Lieut. Slaughter explained, was to avoid the "embarrassment" of getting mixed up in the Douglas' prop wash.

As delicately as our ship was constructed, we could see from out our porthole that there was not a trace of a flutter in the wings—wings of greater spread even than a medium bomber. We decided that in addition to plywood and canvas a lot of higher mathematics had gone into the building of this ship—that stress and strain on every part had been carefully calculated. It was a sturdy craft. We began to let our imagination loose. Suppose this were an actual mission. Suppose the empty seats beside us were filled with helmeted and armed fighting men. Suppose this fertile green country below us was Europe. An air pocket brought us back to reality with a jolt.

We were approaching 4,000 feet. At 5,000 we would cut loose and float to earth. Above the whining of the wind we inquired about the operational tactics of gliders in action. Of course, where and when and how our glider forces are to be employed must be kept a secret for the time being, but to a large degree these missions will be built around two or three basic gliding techniques.

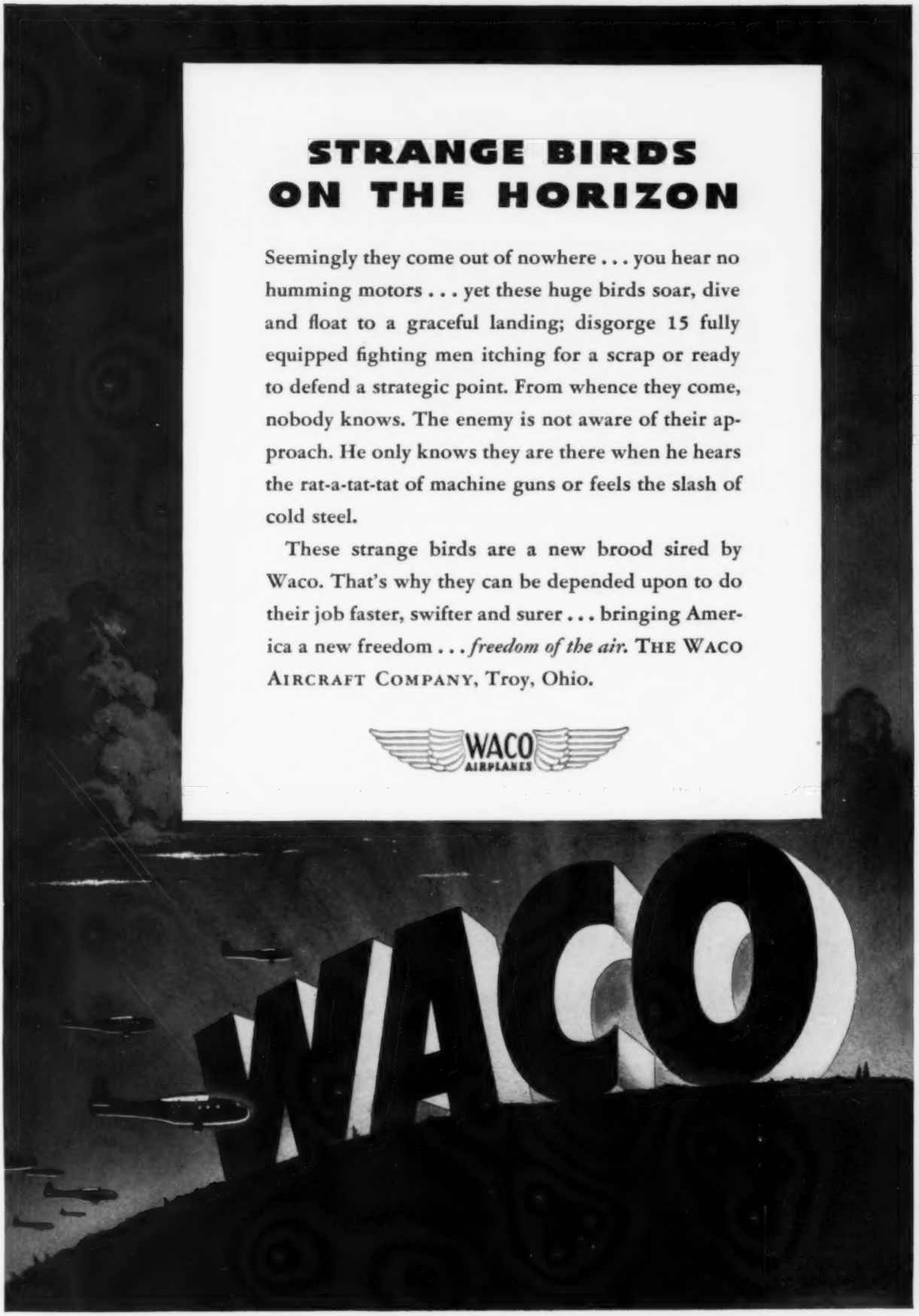
We neared the 5,000 mark. Our speed indicator flirted between 110 and 120. At exactly 5,000 feet, Lieut. Bailey reached for the release lever and cut us loose. It was like coming to a sudden stop in an express elevator. Instantly our speed dropped from 120 to eighty miles an hour. The screaming of the wind died to a whimper. The glistening Nylon rope snapped like a rubber band toward the transport plane as it fell off to the right.

Training Is Hastened

We began to lose altitude in the ratio of one to ten, or in the layman's language, one foot down to ten feet forward. In good weather, Lieut. Decker had told us on the ground, these bulky chanticleers could actually *gain* altitude. In the way of maneuvers they can do most anything in the repertoire of a medium bomber as we now discovered. Lieut. Bailey pulled the stick back and our ship lifted its pudge nose upward. The speed dropped and we felt ourselves going into a stall. Unlike a similar maneuver in a power ship, there was no moaning or vibration here, only the graceful maneuver itself in all its beauty. We went into a gentle dive, and Lieut. Slaughter turned to us with a smile of satisfaction like a man who had just taught his favorite dog to speak for its breakfast.

We soared leisurely for thirty minutes longer, and then settled back down on the broad Stuttgart runway. The landing was as smooth as any passenger liner's. We stopped about 150 yards after our wheels touched the ground.

The Army Air Forces Flying Training Command is turning out competent glider pilots quickly at Stuttgart. Each glider is in the air at least eight hours a day. Each pilot is given his cargo ship training as rapidly as is humanly possible.


STRANGE BIRDS
ON THE HORIZON
Seemingly they come out of nowhere . . . you hear no humming motors . . . yet these huge birds soar, dive and float to a graceful landing; disgorge 15 fully equipped fighting men itching for a scrap or ready to defend a strategic point. From whence they come, nobody knows. The enemy is not aware of their approach. He only knows they are there when he hears the rat-a-tat-tat of machine guns or feels the slash of cold steel.
These strange birds are a new brood sired by Waco. That's why they can be depended upon to do their job faster, swifter and surer . . . bringing America a new freedom . . . *freedom of the air.* THE WACO AIRCRAFT COMPANY, Troy, Ohio.
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FINDING and TRAINING

Air Force Technicians

EVERY time a bomber or fighter rolls off the assembly line, the Army Air Forces Technical Training Command turns out from ten to twenty men whose job it is to keep that plane flying. With 60,000 planes scheduled for construction in 1942 and 185,000 for 1943, the Technical Training Command's program assumes proportions beyond the wildest dreams of the most mechanically minded people in the world.

The task of the Technical Training Command is first to find and then train the mechanics, radio operators, armorers, weather forecasters and a host of other highly-skilled soldier-craftsmen. It's a tremendous assignment, one of the biggest and most important of the war.

In 1938, there was but one school, Chanute Field, but now more than 100 schools, scattered from coast to coast, from the Gulf of Mexico to the Canadian border, are functioning day and night to supply the ever-increasing demand for men to make up the ground crews.

From three original subjects—mechanics, communications and armament—the Technical Training Command now teaches more than a score of technical subjects. They include courses for airplane mechanics, sheet metal workers, weather forecasters, power turrret operators, parachute riggers, propeller experts, gyro instrument men, photographers — in fact everything that it takes to keep the fast pursuit ships and the huge, deadly bombers flying. The AAFTTC is probably the nation's largest single educational system.

Classification Is Key

Some of the schools are big Technical Command bases like Chanute Field, Ill., Scott Field, Ill., Lowry Field, Colo., Sheppard Field, Texas, Keesler Field, Miss. Some are located right in airplane factories. Others are in civilian trade schools which have offered their facilities to the Technical Training Command. When the expansion program absorbed virtually all the Army's resources, the Technical Training Command didn't stop. It leased some of America's most famous hotels in Miami Beach, Fla., Atlantic City, N. J., St. Petersburg, Fla., and Chicago, Ill., for classrooms and living quarters for its men.

And the hub of this ever-growing network is Knollwood Field, N. C., where Major General Walter R. Weaver and his staff supervise and administer the entire AAFTTC. They have developed a highly efficient, scientific method of finding the right man for the right job so carefully that less than 10 per cent of the men selected to go to technical schools for training fail to get through the courses. And only a fraction of this group "wash out" because of academic failures. Of the approximately 10 per cent who fail to finish, some are hospitalized, others are selected to attend Officer Candidate Schools or become Flying Cadets while others are dropped for disciplinary reasons.

Classification is the secret of the Technical Training Command's ability to fit the round peg in the round hole. Into the classification hopper each week pour thousands of recruits — farm hands, lawyers, and clerks, college professors and men of no trade or little education — eager to do their share, but ignorant of their aptitudes.

From each man, classification peels the veneer accumulated in civilian life —may find the lawyer possessed of the highest type mechanical aptitudes, the grocery clerk particularly well-fitted for armorer training, and skilled machinist better qualified to become a radio expert.

Wide Variety of Courses

Usually within twenty-four hours after the inductee reaches the Recruit Reception Center, he has taken his General Classification Test and his

NATURE OF DUTIES

LOCATION OF SCHOOLS

PERIOD OF TRAINING

TRAINING COURSE INCLUDES

	AIRCRAFT ARMORERS	AIRCRAFT MACHINISTS	AIRCRAFT METAL WORKERS	AIRCRAFT WELDERS	AIRCRAFT MECHANICS	TELETYPE REPAIRMEN	LINK TRAINER INSTRUCTORS	PARACHUTE RIGGERS	PHOTOGRAPHERS	RADIO OPERATORS AND MECHANICS	WEATHER OBSERVERS	AIR FORCES ADMINISTRATIVE CLERKS	AIR FORCES SUPPLY AND TECHNICAL CLERKS
NATURE OF DUTIES	Inspect, adjust and repair armament equipment; aerial machine guns, cannon, synchronizers, gunsights, gun cameras, bomb racks, and other armament mechanisms.	Responsible for general machine work and heat treating, involving the repair of air base equipment including tools and re-making certain broken and worn parts and adjustments by grinding and finishing metal surfaces to close tolerances.	Cut and form sheet metal used in the assembly and repair of aircraft parts, fittings, and structural parts, using hand tools and metal-working machines.	Fuse metal parts by means of electric welding apparatus or an oxyacetylene torch to fabricate or repair broken or cracked metal airplane parts.	Check the condition of airplanes and engines, make repairs, replacements, and adjustments; inspect critical parts of the craft, such as electrical and control systems, undercarriage, brakes, motors, and propellers.	Inspect, service, and repair automatic telegraphic typewriters (machines similar to typewriters, used to send and receive telegraphic messages).	Teach instrument flying (blind flying) to pilot students through use of a Link Trainer (a device resembling a plane, complete with instrument panel, in which student is confronted with the problems of blind flying).	Repack parachutes that have been opened in use, or unopened ones that are repacked as the interest of safety; sew and patch, by hand and machine, damaged parachute canopies; replace defective shrouds; repair harnesses; and splice connections between shrouds and harness.	Make photographs from planes in flight; assemble mosaic maps; prepare chemical solutions for developing film and posting pictures; enlarge, reduce and ordinarily picture prints.	Operate and adjust all transmitter and receiver equipment; repair defective radios, test circuits, tubes; isolate defects and repair and replace defective parts.	Analyze weather conditions; observe instruments recording wind velocities, changes in temperature, humidity, barometric pressure, amount of rainfall, and other conditions; prepare weather maps and reports.	Make up and file reports; tabulate and post data in record books and on bulletin boards; take telephone calls; give information to callers; type; operate office machines, such as duplicating machine.	Receive, store, and issue equipment, material, merchandise or tools; check incoming orders against items listed on requisitions or invoices; count, grade or weigh the articles, take periodic inventory; making up necessary reports; type; operate office machines such as bookkeeping and duplicating machines.
LOCATION OF SCHOOLS	Buckley Field, Lowry Field, Colo.	Chanute Field, Ill.	Chanute Field, Ill.	Chanute Field, Ill.	Chanute Field, Ill.; Biloxi, Gulfport, Keesler Field, Miss.; Sheppard Field, and Amarillo, Tex.; Goldsboro, N. C.; Lincoln, Nebr.	Chanute Field, Ill.	Chanute Field, Ill.	Chanute Field, Ill.	Lowry Field, Colo.	Scott Field, and Chicago, Ill.; Sioux Falls, S. Dak.; Madison, Wis.	Chanute Field, Ill.	Fort Logan, Colo.	Fort Logan, Colo.
PERIOD OF TRAINING	12 weeks	16½ weeks	11½ weeks	11½ weeks	18½ weeks	6½ weeks	10 weeks	6½ weeks	10 weeks	19½ weeks	10 weeks	13½ weeks	13½ weeks
TRAINING COURSE INCLUDES	Mathematics; metal work; soldering; electrical armament control; explosives and ammunition; chemical warfare; small arms and gun cameras; aerial machine guns and cannon; synchronizers; bomb racks, floor racks, and tow targets; aircraft machine gunsights; and field exercises.	Basic instruction including maintenance system, mechanical drawing, and shop fundamentals; lathes, milling machines, shapers, grinding machines, and heat treating.	Basic instruction, including maintenance system, shop fundamentals, mechanical drawing, basic metal work, heat treating, aircraft metal work, including use of sheet metals, rivets, screws, repair of radiator, bending metal tubing, repair of fuselage, wing structures, cowlings, fuel and oil tanks; fiberglass forming and repair.	Basic instruction including, maintenance system, shop fundamentals, mechanical drawing, basic gas welding, electric welding, aircraft welding, and heat treating.	Basic instruction in materials, care of equipment, electrical and shop fundamentals; structures; hydraulic systems and miscellaneous equipment; aircraft propellers, instruments, engines, and electrical systems; engine instruction, fuel and oil systems, engine operation and tests; inspection and maintenance of airplane engines.	Telegraph printer (teletype) systems; construction and adjustments of accessory equipment; installations, inspection, and maintenance of typical stations.	Basic maintenance, which includes a study of all unit assemblies, control linkages and mechanism and instrument control, instruments, radio aids to navigation, navigation; meteorology; air regulations; basic and advanced trainer course; and advanced maintenance.	Parachute construction, maintenance, storage, inspection, care and use; aircraft clothing, including construction, maintenance, minor repair, and inspection; maintenance of sewing machines, hand and machine sewing.	Applied mathematics; principles of photography; photographic chemistry and optics; contact printing; projection printing; finishing of photographs, ground cameras; copying; processing of aircraft camera films; printing and mosaics.	Radio operating, including Morse code, code typing; radio telephone and telegraph procedure; flight operations; DC and AC circuits, transmitters, receivers; circuit analysis; use of hand tools; radio compass; maintenance inspection.	Elementary meteorology; surface observations; upper air observations; plotting map signals; plotting wind-aloft charts; plotting atmospheric soundings, plotting Isentropic charts; vertical cross-sections; weather instruments, weather forms; teletype perforations, and teletype procedure.	Administration, including use and disposition of all forms and reports received, employed or rendered by headquarters of squadrons, group wings and posts; business English; business arithmetic; military correspondence; organization, typewriting	Business arithmetic, general technical administration; military correspondence; organization; typewriting; bookkeeping machines; business English; combat orders; engineering operations.

TABLE SHOWS BREAKDOWN OF AAF technicians, their duties, location of schools, duration of training, and essential subjects in their instruction.

education, civilian employment and hobbies all have been entered on his soldier's qualification card that becomes part of his permanent record. This initial Classification takes place before the recruit is sent to the Training Command and is only the beginning.

When assigned to the Army Air Forces, the recruit goes from his Recruit Reception Center to a Basic Training Center of the Technical Training Command at one of the seven following stations — Jefferson Barracks, Mo.; Keesler Field, Miss.; Sheppard Field, Texas; Miami Beach, Fla.; Atlantic City, N. J.; St. Petersburg, Fla.; Kearns, Utah.

At each of these Basic Training Centers, the Technical Training Command continues the classification process where the Recruit Reception Center left off. After being sent to the Air Forces as a result of his initial Classification and assignment at Recruit Reception Centers, the question now becomes: What can this recruit do for the Air Forces?

The sifting and sorting process begins in real earnest at the Basic Training Center. First the new recruits are given the orientation lecture by a Commissioned Officer, who paints a verbal picture of the Army Air Forces Technical Training Command school program. The primary aim of the lecture is to give the enlisted man a clear understanding of what the Air Forces offer him. The technical school for which they may qualify and the training period for each technical course is reviewed. A question and answer form following the lecture helps clarify many doubtful points.

From the lecture room the recruits go to the aptitude testing room. There on a blackboard, listed for their choice, are the Air Force occupations they have just heard described: aircraft mechanic, welder, metal worker, parachute rigger, radio operator and mechanic, photographer, Link Trainer instructor, weather observer and forecaster, teletype mechanic, instrument maintenance, power turret operator, sheet metal and engine overhaul and propeller mechanic, mechanic for electrical, gyro and mechanical instruments, aircraft electrician, engine mechanic, and supply and technical clerk. Any three may be picked by each man and placed in order of preference on a card designed for this purpose.

His choice made, it rests on the recruit to prove he is fitted for specialists training by passing the required written examinations. He is now given a series of aptitude tests, each lasting from thirty minutes to two hours. These are generally given on or about the fifth day the recruit is at the Basic Training Center and require about one day to take a group of these tests.

Interviews Are Thorough

The recruits who pass the examinations are, in so far as possible, assigned to study the Air Force occupations of their choice. But there are quotas to fill and sometimes the man who chose weather forecasting as his No. 1 preference might be assigned to study instrument maintenance, his No. 3 choice.

All men competing for Technical School training in the Classification process take the general mathematics test, the longest of the tests, which has a time limit of two hours; many take mechanical movements test that adequately checks the recruit's ability to visualize or follow machine movements rapidly; the surface development test, and a majority of them take the radio sound test. Still others take more specialized aptitude tests to qualify for more specialized courses.

Examinations completed, the papers are quickly and accurately graded in an electrical test scoring machine, which, by means of electrical impulses through a key sheet, registers on a meter the correct score. The mechanical pencils used by the soldiers in marking their answers on a multiple choice answer sheet are filled with a special lead so that marks made on the exam sheet register when an electrical current is passed through them.

With his scores recorded on his qualification card, the soldier then appears before a friendly, skilled interviewer, who is qualified by experience and training to search the man for further information concerning his occupational background, interests and hobbies that will be of benefit to the Army. Because much depends on the interview, no effort is made to hurry it. Each case is taken up as a new individual problem and sufficient time is allowed to get all the pertinent information of military value from the soldier.

Before he leaves the interview room, the soldier's qualification card is thoroughly examined to assure its completeness and accuracy. Any errors made at the Recruit Reception Center are corrected and omissions of pertinent information is recorded. When ready for filing, the qualifica-

BRITAIN'S PLYWOOD MOSQUITO BOMBER

The new de Havilland Mosquito that made news with its daylight and nighttime raids over enemy territory is powered with two Rolls Royce engines. The reconnaissance bomber is of simple wooden construction and has a wing span of fifty-four feet, two inches, and an overall length of forty feet, nine and one-half inches. It is equipped with a de Havilland three-bladed hydromatic propeller. Armament may consist of four 20mm cannon and four .303 machine guns. The Mosquito is being manufactured by de Havilland in Canada as well as in England.

tion card is a complete, coded individual photograph of what the soldier can best do in the Army Air Forces.

Some, of course, do not qualify for consideration of Technical Schools because of inadequate grades in the aptitude tests, and for these men, the Air Forces offers many jobs whereby they can become specialists on job training.

"Non-Language" Test Used

Not all men, however, go through the examination and interview process. Some of them are by-passed, classified as already experts in important fields. But first they are interviewed by specialists who examine each specialist by means of a standard oral trade test to determine their technical knowledge from the answers he gives to his trade questions. Each specialist, moreover, undergoes a final examination by a specialist well-versed in a knowledge of special abilities recognizable in the man.

Through another procedure goes another group who are not sufficiently well-versed in English for a written examination. For the latter a non-language test has been devised—except for a preliminary and very simple explanation of the method to be followed—not a word is spoken or written. The examiner, using a pointer, taps a pictograph on the blackboard and the examinees check the corresponding pictograph or one of a similar type on the exam sheet. Despite its ultra-simplicity, it is an adequate and relatively accurate test of native talent, susceptible of development.

The man who brings no useful skill for the Air Forces from civilian life and who fails his aptitude examinations, is shown that advancement is not closed to him and how he may get on the road that leads to it. At the same time, no effort is made to gloss over the fact that he must learn the hard way, from actual experience, without the coaching of a trained instructor and a progressive course of lessons. Constructive suggestions are made as to what this man should do on reaching his permanent base.

The job of the classification interviewer is not easy. Yet despite the daily grind of talking to hundreds of men, the interviewers find time for trips to factories, conferences with civilian and personnel specialists, and lecture courses. Where convenient, the interviewers visit schools where men are undergoing technical training to obtain first-hand knowledge of courses pursued—an extremely important and valuable aid in discussing technical training with the recruits.

At the time the soldier is assigned to a school or permanent station, his qualification card, which by this time contains a full biography of the man, is sent as a part of his permanent records to his new station. And wherever he goes throughout his Army career, at home or overseas, the soldier's qualification card accompanies him.

Every bit of information useful to the Army Air Forces is contained on the qualification card. Along the upper edge of the card are coded his marital status, corps area of enlistment or induction, previous military experience and any military skill he may possess. On the right side are listed his name, month and year of enlistment, whether he is in limited service and the languages he speaks or reads, if any. Along the left side appears information concerning any talent for entertainment, his test scores, additional occupations and hobbies, leadership ability, education and the sports in which he excels.

Filed away with thousands of others, each individual card, with all the coded information, can be found by needle selection almost immediately. In operating the Selector, needles, similar to the darning variety, are inserted in a holder according to a coded system. The cards are placed in a selector machine, which is nothing more than a tray with two high sides, and the needles pushed through the holes on the edge of each card. When a false bottom on the Selector is dropped, the cards coded or punched along the edge for the desired classification or skill drop off the needles, while the rest remain suspended.

The Selector's capacity at each operation is approximately 200 cards. Thus, the sorting of cards is a rapid procedure, accomplishing in a few minutes what a generation back took days and sometimes even weeks to get the desired information.

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MARS CONVERTED TO CARGO CARRIER

Conversion of the Navy's giant patrol bomber, the four-engined Mars, to an air-cargo vessel has begun and she will be ready "in a short time" to take up a position at the lead of the Navy's expanding air transport service. Her tactical equipment is being stripped to make room for bulky and heavy freight.

"The Mars has finished her flight tests and has proven herself a highly efficient airplane," Glenn L. Martin said. "She is being adapted for a most important function and to assure her even greater efficiency we are installing the latest Wright Cyclone engines of the over 2,000-horsepower type."

The pioneer manufacturer, whose China and Philippine Clippers were the first of the transoceanic air giants, emphasized that the Mars has great value both as a combat airplane and as a cargo carrier.

PBM-3's Also Converted

"This basic type, already engineered and needing only minor modification, can be built in quantity to perform either function," he declared. "Built especially as cargo ships, these vessels would have a considerably greater gross weight than the 140,000 pounds of the Mars as a patrol bomber. Turned out as combat airplanes, they can be heavily protected with armor and armament and can strike fearful blows at enemy ships and installations.

"Moreover, they provide a firm platform for the defensive fire power necessary to make them difficult to bring down in combat."

The Mars' conversion constitutes one more spectacular step the Navy is taking to assure best delivery of materials to distant forces. Recently it was announced that a cargo version of the Martin PBM-3 patrol bomber was being turned out in numbers, and other airplanes have been adapted to help build up transports capable of setting up fast supply lines.

The importance of the Mars as a cargo ship has been emphasized often in the last few months, especially durthe heavy depredation of Axis submarines on surface shipping. It was pointed out by Martin that hardly more than a score of such flying vessels could deliver as much cargo from California to Hawaii in sixty days as a 10,000-ton Liberty ship. Only 343 ships of the Mars model could equal the cargo carrying of a twenty-five-ship surface convoy, Mr. Martin added, remarking that such a convoy requires up to a score of naval escort vessels as protection.

"The important consideration in such an operation is that critical supplies and materials are pushed ahead and arrive on fast schedule," Martin said. "Where it takes months for slow surface convoys to reach some of our distant fronts, these flying ships can make it in a few days. The safety factor is another consideration. There has been almost no loss in transoceanic cargo transport schedules since the war began. These ships fly the weather, take cloud cover, and have a wide choice of altitude and routes. The flying boats can land in any protected water, and can even land at sea in emergency."

Carries Own Beaching Gear

The Mars, whose interior is equivalent in cubic content to a fourteen or fifteen-room house, has a supercharged cabin to allow normal breathing of her crew on long hops, supplanting uncomfortable oxygen masks at high altitudes. As a patrol bomber, she has a private stateroom for the captain, officers' quarters forward, and crew quarters aft, as in a Navy surface ship. Two messes, two shower-baths, a wardroom for officers, and recreation space for the crew also are included in the big ship's facilities.

Her flight deck is equivalent in size to the entire interior of an average twenty-one-passenger airliner. Her crew can walk into the wings and service the four engines in flight. Her equipment includes a collapsible motorboat and she is able to hoist her beaching gear aboard and carry it away to establish temporary base in distant waters.

Such flying ships, Mr. Martin believes, will form the nucleus of a vast merchant marine of the air when victory shall have been won. But his engineers already have a design for a 250,000-pound ship and are considering another of 500,000 pounds.

"There are no practical limits to the size of flying ships, except the availability of payloads," Mr. Martin concluded.

★ ABILITY

★ PRECISION

★ PRODUCTION

DOLAN AIRCRAFT MANUFACTURING COMPANY

DALLAS, TEXAS

Noisy Nan

and the

Flying Marines

A big part in the Marine Corps show is played by its heroic Air Force. It sprouted wings with a homemade box-kite that could do everything but fly.

FIRST PILOT, PLANE in Marine Corps were Lt. A. A. Cunningham and "Noisy Nan," which he rented for $25 a month

NEVER in the history of naval warfare had *fighter* planes alone sunk a capital ship. Nobody, particularly the Japanese, put much credence in the theory that it could be done, but they didn't include Marines in four patched and battered Grummans at Wake Island in their calculations.

When the Japanese sailed their armada of twelve ships, heavily protected by anti-aircraft batteries, in the direction of the sandy, tree-studded island for a final assault December 11, 1941, they paid scant attention to those four creaky Grummans hovering overhead.

Remember Wake Island?

As the fleet neared the island, the leading elements opened fire, but the Marine gunners standing by were waiting to see the slits of their eyes. Boldly the Japs approached to 4,700 yards. Then all hell broke loose.

The Marines opened with their five-inchers and those four old planes came screaming down. Those planes were poison. They concentrated on two ships, one a cruiser. With eight 100-pound bombs, Captains Henry T. Elrod and Frank C. Tharin sent the cruiser to the bottom. The other ship last was seen trailing smoke.

That December 11th was a great day for "Marfitron 211" and the little island's defense battalion. Before the Japanese could flee out of range they had left behind, on the bottom, a cruiser, two destroyers and a gunboat.

By the time the Japs with their overwhelming forces finally conquered the island, those planes and the defenders had accounted for a light cruiser, two destroyers, one submarine and six bombers. Probably more planes were shot down by those gallant Marine flyers, but they haven't had a chance to make their report, yet.

One remarkable feature of this unequal battle is the fact that at no time were there more than four Marine planes in the air and frequently only one or two. The others were being patched up for the next day's battle.

Wake Island is now history, another glorious page in the history of a Corps whose fighting traditions date back to November 10, 1775, when it was founded at Tun's Tavern in Philadelphia, Pennsylvania.

Down the Smokestack

Not much later, after Wake Island, the Japs again learned what sort of men they were up against when they decided to take on the United States and that nation's little band of professional fighting men.

The little men with the too-big ideas started in the direction of Midway, probably believing they were on their way to "dictate peace in the White House." They brought along a large portion of their fleet and aircraft carriers.

When word of their approach reached Major Lofton R. Henderson of Coronado, California, he led his squadron of dive bombers into the air and straightway made for the enemy.

The Major picked out two aircraft carriers and ordered his men to concentrate on them. Zero fighters swarmed about the out-numbered squadron, but were brushed off. The storm of anti-aircraft fire was ignored. The squadron kept to its purpose.

Corporal Eugene T. Card of Oakland, California, was in that fight, and received three shrapnel wounds, but what happened to his Major concerned him more than his own injuries. The corporal was in a plane that followed the Major down to within 300 feet of the carrier.

Here's what happened as related by the corporal: the left wing of Major Henderson's plane was set aflame at the outset. The Zeros had been concentrating on the leader, apparently believing that if he were downed, the remainder of the squadron would break off the attack in confusion.

Heroics in Peace, Too

In the cockpit, the Major didn't waver. He aimed his plane at the carrier he had picked out as a target. The fire spread. A heavy trail of smoke poured out behind him. The heat inside that cockpit must have been terrific.

Down, down went the Major. The throttle was open and that plane hurtled through the air like a shot. He crashed into the carrier. Corporal Card is certain the Major dove down the smokestack.

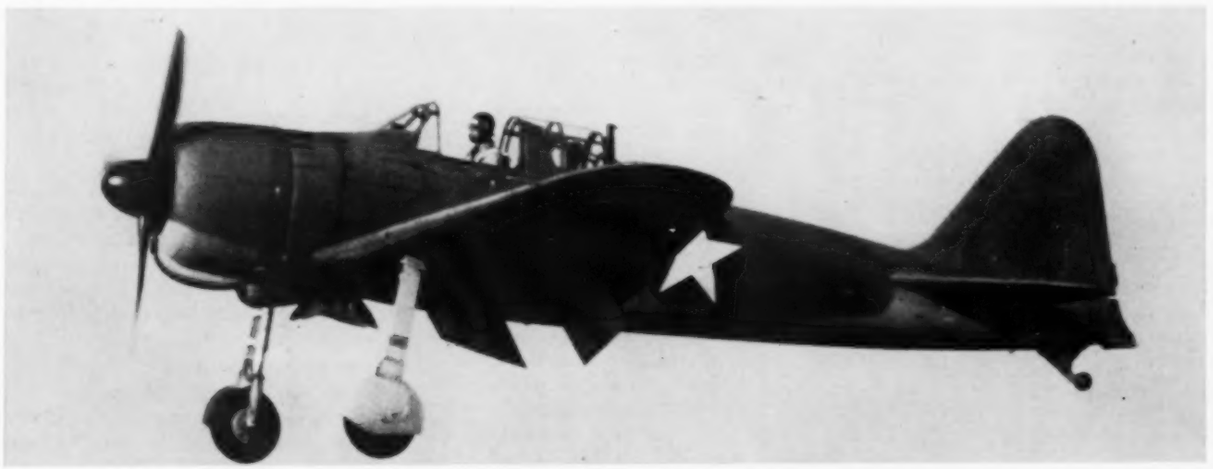
All the stories of heroism in this war, however, are not concerned with actual fighting. Early in May the commander of a Marine base on the Atlantic coast received a report just before midnight that survivors of a torpedoed Norwegian freighter were riding the sea in an open boat near

NAVY REBUILDS AND TESTS A ZERO

CAPTURED ZERO—Disabled and forced down during an air battle over the Aleutian Islands, this vaunted Japanese Zero (Mitsubishi 00) was salvaged by Americans and shipped to San Diego, Calif., where it is shown undergoing repairs. The highly maneuverable fighter has a wing span of thirty-nine feet five inches and an overall length of thirty feet three inches. It mounted two 22mm. low velocity cannon in the wings and two 7.7 guns in the nose.

READY FOR TEST—With Lt. Comdr. E. R. Sanders, USN, at the controls, the Zero is about to be taken upstairs. It mounts a 14-cylinder 900-horsepower engine using modifications, or direct adoption, of many features found in Pratt & Whitney and Wright engines. The propeller is identical with the Hamilton Standard model. Preliminary flights showed the Zero to have top level speed of slightly less than 300 m.p.h.

Navy Photos



UNDER NEW COLORS—With the white star of the AAF replacing the red disk of Japan on the wings and fuselage, the Zero was found a stable, easy-to-fly plane, well constructed but lacking self-sealing gasoline tanks and armor protection for the pilot. The fighter is reputedly at its best in a dogfight where tight turns make high speed impossible. Its combat weight is approximately 5,200 pounds, without belly tank.

an unlighted buoy some fifteen miles out.

Flying by dead reckoning, Major John S. E. Young located the boat, directed a rescue boat to the scene and hovered protectingly over both while the men were taken aboard.

Although not connected with the war, there's another story of rescue, skillful navigation and personal courage of which the Corps is proud.

One sweltering July afternoon in 1936, four Marine flyers at the base in the Virgin Islands received a radio message, relayed from Puerto Rico, which told of a sailor who had gone mad and cut his captain's throat. The message was cryptic, but contained one significant phrase: "An hour gained may save his life."

That was all the Marines needed, although they knew the sea was rough and landing dangerous. Within a few minutes their flying boat was gassed and they set out, accompanied by a naval surgeon, in search of the steamship *Catherine*, some 140 miles out in the Caribbean.

"Noisy Nan" Started It

Aided by smoke clouds from the vessel's funnels, they soon found their goal and set the amphibian down. A choppy sea caught one of its wings and spun the aircraft around. Undismayed by the near-disaster, the Marines waited for the *Catherine's* lifeboat to edge close enough to permit transfer of the wounded man. A wave did the trick, shoving the small boat under the bow. Twice, after the captain, Terrence Burrows, was taken aboard, the amphibian tried to take off, but was nearly swamped. On the third try it rose, dripping, into the air and made for Puerto Rico. Captain Burrows recovered.

But to get back to the Air Force as a fighting component of the Corps. Marine aviation can celebrate its own particular anniversary as May 22, 1912, whereas the Corps itself celebrates November 10, 1775.

Marine aviation begins with First Lieutenant Alfred A. Cunningham, who by sheer persistence, started the aviation branch, thus making the Marines the "fightin'est" outfit on land, sea and in the air.

As far back as he could remember, Lieutenant Cunningham had been obsessed with the idea of flying. Along in 1903 he made two flights as a passenger aboard gas inflated balloons in Georgia and he couldn't get the flying bee out of his bonnet.

The year 1911 found him stationed at the Philadelphia Marine Barracks as a Second Lieutenant. There he met an inventor named Brown, who had used his last money to build an airplane. The lieutenant saw in this an opportunity to get at least one Marine in the air and promptly rented the plane for $25 a month.

Then his troubles really started. He approached Rear Admiral Albert W. Grant for permission to use an open field at the Navy Yard as an airdrome. The admiral was caustic—to put it mildly—but finally consented. The lieutenant's adventures with "Noisy Nan" which wouldn't fly at all under normal conditions, began.

Marines Used Catapult First

The lieutenant was a man of resource. He built a bump into the runway on the theory that if the plane was bumped into the air it would fly. In such a manner he succeeded in obtaining flights of at least fifty feet.

"I called her everything in God's name to go up," said Cunningham, "I pleaded with her, I caressed, I prayed to her to lift her skirts and hike, but she never would. Though I will say this, that beyond that, she never threw me down. I learned air things from that old girl."

Major General Commandant William P. Biddle, a Philadelphian, sent for Lieutenant Cunningham soon thereafter. He was hot under the collar.

"What," he demanded, "are you doing up there in Philadelphia? The politicians are trying to get a Marine Corps flying field established at Philadelphia and it looks as if you were at the bottom of it all."

The Lieutenant got off light that time, but finally the political pressure got pretty stiff on Washington officials. They sent for the Lieutenant again and he finally had to admit that he was behind the whole movement. They reached a compromise. For calling off his campaign, Marine Corps officials promised to send him to the Naval Aviation Camp at Annapolis. There he earned his wings.

To Lieutenant Cunningham goes the credit, too, for attempting the first catapult take-off ever attempted from a warship under way. He broke his back in the effort. The try was made in 1916 off the battleship *North Carolina*.

The catapult did not function properly and the plane failed to attain flying speed. One wing was tilted by the disturbed air in the wake of the ship and the plane turned over on the Lieutenant. Incidentally, he did not know of the fracture until it was disclosed by an X-ray some years later. He thought he had suffered a torn ligament.

World War I Record

In April of 1916, the dauntless Cunningham asked to attend the Army Aviation School at San Diego. When his request was approved, he became the first officer "in the Navy or Marine Corps to be ordered to purely land flying."

When the World War broke out about a year after Cunningham's request for transfer (he was now a captain), the Marine section of naval aviation consisted of five officers and thirty enlisted men, all stationed at Pensacola, Florida.

Taking his handful of men abroad, he wrangled a field from the French and set about trying to have his unit attached to the Marine Brigades already in action, but failed.

"This force," he wrote later, "although enormously handicapped by failure to deliver us all of our planes and being placed at the front under the administration of officers unfamiliar with aviation, overcame obstacles and performed its mission in true Marine Corps spirit."

In all, four Marine squadrons of land fighting planes and a headquarters company were organized before the war's end to operate under the Navy as the Day Wing Command of the Northern Bombing Group in the Dunkirk area. They concentrated on anti-submarine activities; patrol and bombing U-boats' bases at Ostend, Zeebrugge and Bruges.

Since he had few planes, Cunningham requested the British to lend his men planes. The British complied and as many Marine pilots as could be accommodated operated with the British until the Armistice.

For a comparatively small outfit, the Marines did an outstanding job in that first war for democracy and its ideals.

In one of their bombing attacks they killed thirty German officers and 300 men, while in another operation they dropped over a ton and a half of food to a French regiment cut off and surrounded by Germans and they did it in the face of terrific anti-aircraft fire.

For participation in this action Captain Robert S. Lytle and Captain Francis P. Mulcahy were awarded the Distinguished Service Cross.

The French soldiers had been cut off from supplies for two days and could not be reached by ground relief forces. Aid from the air appeared to be the only solution. The two Marine officers were among the volunteers.

Loading their planes with bread and canned food, they took off. As they neared the besieged group the Germans threw everything at them but the barrels of their artillery. Despite the explosions of AA shells and a curtain of machine gun fire, the two officers dove to within 100 feet of the ground, leveled off and dropped the precious food to the hungry French poilus.

Four times they repeated this hazardous performance, each time through a hail of enemy fire. Somehow they escaped without injury.

Acquired "Know How" in Peace

Several days prior to this action, Captain Mulcahy had been attacked by eight enemy scouts. Instead of attempting to fly out of the trap, he met the attack and shot down one German plane before his gun jammed. He succeeded in outflying the remaining seven and returned safely to his base.

In much the same manner, Captain Lytle, while flying near Pitthem, Belgium, developed motor trouble. About this time twelve German Fokkers dived upon the crippled ship. Instead of seeking refuge, the captain and his observer engaged the nearest enemy, shot him down, and then out-maneuvered the rest of the enemy until his motor quit cold. The captain then set his bullet-riddled plane down under fire within the Belgian lines and escaped unscathed.

Since the World War, Marine Aviation has been expanded considerably and has done much pioneering work in long distance hops and the scientific advancement of flying.

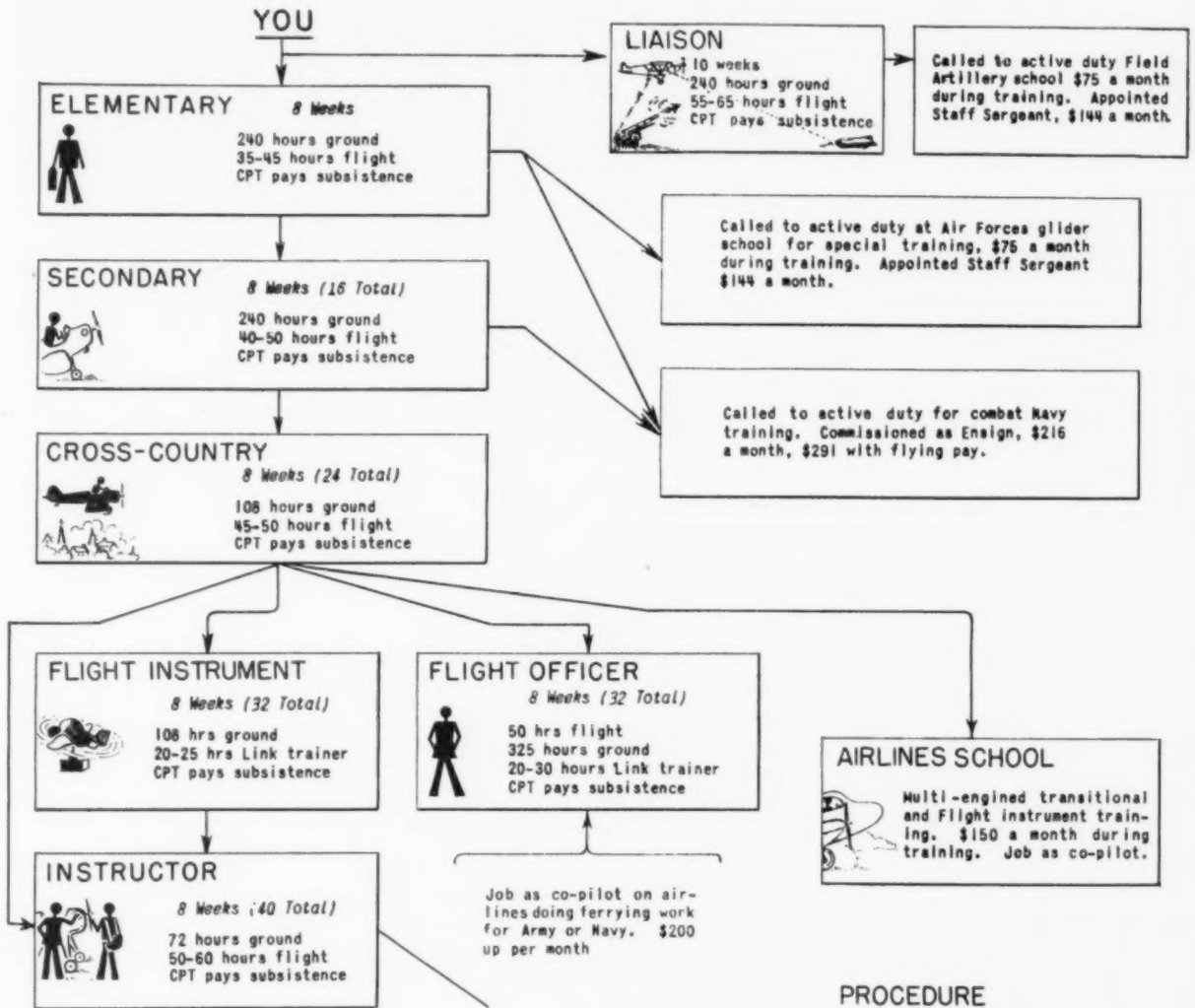
For example, on April 22, 1921, Lieutenant Colonel Thomas C. Turner led a flight from Washington, D. C., to Santo Domingo, D. R., and return. It was the longest flight, unguarded over land and water ever accomplished by naval aviators up to that time.

To Captain Alton N. Parker, the Navy gave the Distinguished Flying Cross for participating in a flight, December 5, 1929, as test pilot over unexplored regions of the Antarctic with Admiral Richard E. Byrd's expedition. The flight led to the establishment of this country's claim to a large portion of the region, and discovery of a new mountain range.

There have been many such peacetime activities which have kept Marine Corps aviators in fighting trim, but the list is too long. It was by such peacetime work, though, that Marine pilots acquired the "know-how" of flying which gives them such a decided advantage in this war.

FLOW CHART SHOWS SCOPE OF ALL-OUT CPT

All-out CPT operations, at last undertaken for the Army and Navy Air Forces, have expanded tremendously in recent weeks. The following flow chart graphically portrays the biggest training program ever attempted, citing opportunities awaiting students and, under the heading "procedure," explaining how to qualify.


YOU
LIAISON
10 weeks
240 hours ground
55-65 hours flight
CPT pays subsistence
Called to active duty Field Artillery school $75 a month during training. Appointed Staff Sergeant, $144 a month.
ELEMENTARY 8 Weeks
240 hours ground
35-45 hours flight
CPT pays subsistence
Called to active duty at Air Forces glider school for special training, $75 a month during training. Appointed Staff Sergeant $144 a month.
SECONDARY 8 Weeks (16 Total)
240 hours ground
40-50 hours flight
CPT pays subsistence
Called to active duty for combat Navy training. Commissioned as Ensign, $216 a month, $291 with flying pay.
CROSS-COUNTRY 8 Weeks (24 Total)
108 hours ground
45-50 hours flight
CPT pays subsistence
FLIGHT INSTRUMENT 8 Weeks (32 Total)
108 hrs ground
20-25 hrs Link trainer
CPT pays subsistence
FLIGHT OFFICER 8 Weeks (32 Total)
50 hrs flight
325 hours ground
20-30 hours Link trainer
CPT pays subsistence
AIRLINES SCHOOL
Multi-engined transitional and Flight instrument training. $150 a month during training. Job as co-pilot.
INSTRUCTOR 8 Weeks (40 Total)
72 hours ground
50-60 hours flight
CPT pays subsistence
Job as co-pilot on airlines doing ferrying work for Army or Navy. $200 up per month
After further training by Army or Navy, assigned as civilian instructor for Army, or as Service Pilot with rank of Flight Officer or 2nd Lieutenant, varied duties; or to Navy as instructor with commission.

Navy also accepts experienced pilots as instructor trainees. (Minimum experience, CPT elementary course graduate, or equivalent.) Given probationary commission, Ensign, $216, or Lieutenant (jg), $247 a month during training. After specialized Navy training at Pensacola, assigned to active duty as instructor, etc.

Women with 200 hours flying time eligible for special CPT cross-country and flight instrument course, 100 hours. $150 a month during training. Assigned to active duty with Women's Auxiliary Forces, Air Transport Command, $250 a month, on civil service status.

PROCEDURE

(Army)

1. Necessary to qualify
   (a) If between 18th and 27th birthdays, must have been rejected for combat pilot on mental or physical examination—or
   (b) Must have reached 27th but not 37th birthday
2. Make application CPT coordinator, any CPT training center
3. Pass C.A.A. Mental examination
4. Pass Commercial CPT physical examination
5. Secure coordinator's certification
6. Secure CPT approval on Form 1035
7. Obtain clearance local draft board on Form DSS 190
8. Enlist in Army Air Corps Reserve

Need-1. Birth certificate
2. Two Copies Medical Exam Form 165
3. Three letters recommendation
4. Two copies Form 1035
5. One copy Form 190

(Navy)

1. Apply Naval Aviation Cadet Selection Board. Join Navy as Aviation Cadet, Class V-5. Or, apply for probationary commission, if qualified. Assigned to CPT Training Center.

[Prepared October 10, 1942. Subject to change.]

THE Sky's the Limit

BY BILL GREEN

Paradoxes of global war . . . Let's prepare for all emergencies . . . Just thinking — and wondering . . . Analyzing the private pilot . . . He has lots to learn, including common-sense pilotage . . . Bouquet for industry.

On Viewing the War

Whose war is this, anyway?

From a purely academic analysis of things, it seems to us that there are a number of paradoxes in this war. First, we haven't really done much fighting, as yet, and all the fighting is being done on territory belonging to some other country. Second, we seem to be called upon to furnish a good portion of the supplies, materials and armament.

If another front is developed, it will not be on any of our territory. When another front is developed we will have to furnish the major part of the equipment for it. Furnishing all that equipment is going to require a tremendous amount of manpower. More manpower, maybe, than we have. Developing an army that can lick the rest of the world is going to require a lot of men—perhaps twenty millions of them. We are now talking of a ten and possibly a thirteen-million-man army.

Radio commentators, news men, and some perhaps more authentic sources, tell us that it now requires about eighteen men on the ground back home for each fighting man properly equipped. Let's see, now, how many people that will take to keep everything going: Well, ten million plus eighteen times ten million equals 190 million people. Since we only have about 140 million people, that leaves us looking for some forty million—just to even up the statistics—and about a hundred million if you are looking for soldier and factory material. Looks like slim pickin's unless we are going to adopt some different tactics.

We would suggest — and this is, we admit, somewhat presumptuous, in view of the fact that we do not happen to be a world-renowned strategist and war expert — that we concentrate on supplying people with the equipment — which we can do; and take care of our own defense requirements; and not try to do the whole works ourselves. After all, nobody has ever yet been able to fight all the world's battles, and lick all the world's supply problems — alone.

Then, to play safe, we should start a compulsory military training, even for factory workers and everyone—giving every able-bodied man in the US at least one year's military training so that they would be available—in case of necessity. Two-week camps held continuously throughout the year, and compulsory, would keep the major part of them physically fit and up to date. Then, in the event that things took such a turn that some of our present allies would not be completely co-operative, we would be in a position to muster an army suitable for any emergency.

Our present task forces, expanded somewhat, with rotated personnel, could assure us of plenty of trained and up-to-the-minute leaders.

A program of supply for our own forces would leave us with a large reserve of military equipment and supplies — in this country — where we could lay hand on it.

After all, this writer is in favor of protecting the USA first, last, and all the time. Our last line of defense is in this country.

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Food for Thought

Things we wonder about:

1. How the government expects us to keep our war plants going when they persist in drafting our experts.

2. How they expect to make it look consistent when they try to stabilize wages and prevent inflation, then order us to pay double time for the seventh day in a week.

3. Where some of the admirals get the misinformation they give to the press.

4. How things can change to exact opposites: For example, ten years ago if a man walked down the street with a $20.00 gold piece and a pint of whiskey in his pocket, it would have been legal to have the gold piece, but illegal to have the whiskey. Now, if he has the whiskey, it's OK, but illegal to have the gold money.

Do you know of any similar simple cases? Would be glad to have them.

5. How come we were so cocksure we believed we could lick the Japs in three weeks? Remember that?

6. It is reported the Japs are now getting oil from the East Indies. We heard those fields were destroyed. In our experience it takes a lot longer than the Japs have had to completely drill and recondition an oil well and gathering systems. Must not have been a good job of destruction.

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Private Pilots at Work

We've had plenty of opportunity recently to observe the aptitudes and abilities of some thirty or forty private pilots and watch them work, day after day. We believe they are a little better than the average cross-section, so the following comments ought to be pretty well applicable to the rank and file of average civilian pilots.

First, the average pilot puts a lot more store by being able to maneuver the airplane than he does in knowledge of navigation, radio, engines, and other technical facts relative to the airplane construction, load factors, safety, etc. Today there are many pilots with lots of hours, who have never been out of sight of the airport. They can fly a plane a lot better than most cross-country pilots. But they are not safe to send out on a cross-country flight, especially if the weather is anything except CAVU.

Second, the average pilot has not been interested in or willing to study any of the engineering fundamentals of flying. Some of the best of our civilian pilots are woefully ignorant of latitude and longitude, Greenwich Mean Time, load factors, dew point and temperatures, carburetor icing, tuning antenna to resonance, talking

into microphones, tuning receivers, etc. That's the reason the Army and Navy and Pan American have had to take pilots with several thousand hours and send them to school. Such knowledge is indispensable if a tough job is to be done—consistently.

We would like to make the following suggestions to every civilian pilot —and some of these wouldn't hurt some other pilots, either:

First, if you intend to leave the safety of your own airport vicinity, learn something about maps:

a. Latitude and longitude — this is simply explained in CAA Bulletin No. 24, in the first two—and subsequent chapters.

b. Learn the meanings of all sorts of symbols which are found on most air navigation maps.

c. Try co-ordinating what you personally know about your own local section with a map of that locality. Study the railroads, rivers, highways, locations of towns, etc. You will find that a lot of details are correct—some will be wrong—and a lot of things will not be like you thought they were. Now you are beginning to find out something about maps. That's the first thing you have to know to be able to locate yourself, if you are lost.

Second, learn all about your compass and other navigating instruments. This is taken up in simple detail in the same CAA Bulletin No. 24, which is entitled "Practical Air Navigation". No matter how how good a pilot is, he can always learn something from that Bulletin.

One simple thing that most pilots should learn is this: A compass is very simple, and usually, if it will rotate freely, it is working. Some pilots have felt that their compass was "screwy" when they thought that north was some other direction from what the compass indicated. Assuming that the compass was right *once*, and that it will still rotate freely, about the only thing that will cause it to be *somewhat* inaccurate is the proximity of some iron or steel object, or a magnet. Hanging the telephone headset up in the ship within a foot or so of the compass will cause it to swing to some new heading. Turning on your radio, or lights, or other electrical equipment, if the wiring is improperly installed (too near to the compass, or when twisted leads are *not* used) will also deflect the compass.

All Airplanes should *periodically* have the compass swung or calibrated. This should be done at a place where the directions are plainly and accurately indicated on the ground—distant by several hundred feet from any steel buildings, other airplanes, electric wiring, steel or iron pipes—even when buried, automobiles, or other electrical or metallic equipment. The tail should be elevated to normal flying altitude. The engine should be running at sufficient speed for the generator to be charging normally. Radio should be turned on—and off —to note whatever deflections occur. Then, with *everything* functioning as in normal flight, the compass headings for each actual magnetic heading should be noted, and posted on a small card in the cockpit or cabin. Pilots living in states where there are regular north and south and east and west section lines may calibrate their compasses accurately on north, south, east, and west headings, and on 45°, 135°, 225°, and 315° by flying toward diagonally opposite section corners. Such compass headings must be corrected for magnetic variation applicable to the locality. This may be determined from the Department of Commerce sectional maps, or other authority.

Third—and this is hard, you must learn to do things *precisely*. Some of our pilots came to us with many hundreds of hours, mostly on small fields with no paved runways, and were unable to hit the runway, when landing. Believe it or not, most people let the airplanes fly them. Few pilots actually put their airplanes *exactly* where they want them. *That* is what causes most of the trouble.

Now, if you were planning to fly over to Podunk, a distance of 150 miles from here, you could look on your map and find that the compass course is 195°. So, if you had a good compass, properly compensated and calibrated, and you started out flying at the rate of 100 miles per hour on a course of 195°, you could normally expect to arrive there exactly on course, in one hour and a half—if there were no wind. If, however, you let the ship wallow around a bit, and it *averaged* flying a course of 190°, you would be thirteen or fourteen miles off your course, at the end of 150 miles—and if the visibility were normal, from five to eight miles, you wouldn't even see your objective. Then, if there were a little wind, you would really be lost.

Well, when you are lost, you are really in bad shape. Now, however, since it is only on paper, this time, you still have time to get Bulletin No. 24 and bone up on such things a little bit. Then, if you do get lost, it may not be so serious. Practice holding your ship *exactly* on your compass course—for ten or twenty minutes. Bet you can't do it! Study about wind effects.

Well, we wish we had time to teach you all about navigation. But, then, we aren't the one to do it—we were lost the other day ourselves.

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Formula for Winning

Of course, it is premature to argue who is largely responsible for us winning this war. We haven't even started winning it yet, although we are pretty certain that we will.

Our candidate, however, for a large share of the honors, when, as, and if we win, will be, we think at present, industry.

After twelve years of manhandling, first at the hands of speculators, then by New Dealers with multitudes of new taxes, many apparently aimed at completely throttling the whole works; then by the unions and New Dealers; and now by priorities — or *lack of them*, industry is still coming through with the stuff—the bacon, we mean. Almost every company we know is turning out three to thirty times as much as they formerly delivered. They are doing it with smaller margins—with a smaller ratio of man hours per unit—with less assurance of future reserves and safety.

Our suggestion for fighting the next war would be to contract it to a firm of twelve or fifteen big companies—on a fixed bid basis—with penalties for delays in victory. The job would be done on schedule—or before—and we might even get a rebate.

SANDRA THE SANDER —By Beeman

—Hughesnews.

By
JIM CHAMBERS

FIRST STEP in simplified assembly line covering of slipping fabric cover over skeletal rudder frame.

ANOTHER GROUP of workers performs the second step by sewing up the openings of the cover.

Building Planes Has Been Made Easier

LIGHT SILHOUETTES ribs to allow worker to center doped strips without wasting time to mark guide points.

FINAL STEP is performed by another group of workers who place screws through strips and fabric to ribs.

Work Simplification

EVERY plane manufacturer in the United States is trying to find the "straight line"—the shortest distance—between the start of production on an airplane and the finished job. North American Aviation, Inc., has been driving toward that ultimate goal for a long time. North American's Texas plant has gone wholeheartedly into the task of eliminating the curves and the detours between start and finish of plane manufacture.

One after another kink in the production line has been straightened out because of a combination of circumstances which has greatly stimulated the search for the straight line.

The only answer was to find a way to simplify the various jobs so the "raw recruits" could be taught a comparatively simple job in a hurry. In doing that, "green hands" not only learned their jobs much faster, but many a production short cut was discovered also.

Airplane manufacture, even less than ten years ago, was pretty much of an art. Each plane was virtually custom-built. Many parts were shaped by hand, and the men who did the job were artisans, long trained for their particular tasks. The airplane industry had made progress toward speeding up the process of training and production alike, but so few planes were built that models changed much too rapidly for manufacturers to attempt expensive tooling-up for anything approaching mass output.

When the threat of war brought sharply increased demands for planes, however, North American began to look for ways to break down the production process, this breakdown at the same time making each individual job simpler.

Actually, the process is called "work simplification", and there are scores of examples, big and little, of such simplification in the manufacture of AT-6's at North American's plant.

How Simplification Works

Supervisory personnel of the factory had to initiate the process of breaking one job into two, three or perhaps four simpler jobs, so each operation could be learned more quickly by a raw recruit. But once this job breakdown process was started, the workers themselves began thinking in terms of work simplification, too.

A job formerly done by one worker, now, in many instances, is broken up into a number of jobs. To master one of these simplified tasks a new worker has to learn only a third or a fourth or a fifth as much about the job as was necessary formerly. And many an individual worker performing the same comparatively simple operation time after time, has found ways to reduce the time and effort required for the work.

Covering and "upholstering" a rudder used to be a one-man job. At one station, the workers took the skeletal metal rudder frame and slipped the fabric cover over it. Then he moved to another location to sew up the open end. Next he moved to another bench to place doped strips as reinforcement over the ribs. Then, in the final operation of the series, he went to still another post to place screws in the ribs.

That's the way the job used to be done—by one man. And that one worker had to be trained in every one of those operations before he could undertake his task.

Now, the same procedure described above is done by four persons, or four groups of workers. One worker slips the fabric covering over the rudder skeletons. That covering formerly was in one piece, and frequently wrinkled while being drawn over the frame. Now it is in two pieces, slipped on from each end and the wrinkle problem is a problem no longer. A second worker does nothing but sew up the openings. A third has the task of placing the doped strips over the ribs. Another places the screws in the ribs.

That is work simplification. And the advantages are obvious. It takes much less time to train a raw recruit to do one job, such as slipping the fabric coverings over the rudder skeleton. In addition, workers gain speed rapidly when they perform the same comparatively simple task time after time. And the personal equation enters into the operation also. Workers at one station feel a spirit of competition with those at another station. No one group wants to be outdone by another. The result is increased output, as each subdivision of workers strives to "keep ahead" of its competitors.

Welders Never Idle

Simplification of the work at each of these stations is another phase of the breakdown process. Performing the same task hour after hour, day after day, the individual worker seeks —and often discovers—short cuts that save time. There is a good example in the covering department.

In the third step of the broken-down process of covering a rudder, the doped strips must be centered exactly over the ribs of the metal skeleton. Those ribs, of course, are invisible, being covered by the tightly-stretched fabric. Formerly, a worker located each rib (and there are a number of them) by feel, then marked the outline on the fabric with a pencil. That simple operation took time, more time than one Texas worker believed necessary. So he made a suggestion to his foreman:

Why not place a light underneath the fabric-covered rudder, thus silhouetting the ribs, and making it possible to center the doped strips without the extra operation of finding and marking the ribs?

The foreman thought it was a good idea, worth a trial. So he and the worker rigged up two fluorescent lights underneath the wooden stand on which the rudders were placed for the stripping operation, and switched the lights on. Through the white fabric, the ribs stood out in bold silhouette, so clearly, in fact, that every screw-hole was visible! The worker's idea was accepted, and valuable minutes saved on one simple operation.

There are many examples of such improvements throughout the Texas plant. Each in itself may be relatively insignificant, but each saves a little time, either in actual production, or in the training period for new workers.

In the welding department, for example, repairs to the crater eliminator on arc welding machines necessitated disassembly of the entire front end to disconnect two wires. Removal of the crater eliminator and installation of a spare one required one hour's work. The operation was necessary once every five days. During the hour's time, the welder and helper were held up in their work until the spare part could be installed.

Trimming Fuse Boxes

One of the workers in this department suggested revision of the machine by installation of plugs for connection of the two wires. As a result time required for removal of this unit was cut to five minutes. After revision, it was found that repairs were necessary only one-third as often as previously, thus reducing still further the amount of "down time" on machines. The welder and helper were able to continue work with only five minutes' interruption.

Another time-saving device, designed by two workers, has just been put into operation in the sheet metal department.

At regular intervals, thousands of fuse boxes are turned over to this department for trimming to the depth required for use on NAA planes. Under the old method, each of the four edges on the open side of the fuse box was trimmed on a small circular saw, about two inches in diameter. This was really four brief operations in itself. Then the worker had to smooth the sawed edges. The sawing process alone took twenty second for each box.

Now two fuse boxes are trimmed in five seconds!

Modern magic? Not at all. The "secret" is relatively simple.

The foreman and leadman in this department designed a jig, a rough one made of wood. Fuse boxes fit into each of two identical niches in the jig. The edges to be trimmed protrude slightly. A "runner" on the jig fits into a groove on the saw-bench. All the operator has to do is slide the jig forward, and a large circular saw trims eight edges almost simultaneously. That's a five-second job—and more precious time has been saved for the task of "getting 'em built."

But the improvement in this one operation didn't stop there. When tests of the crude wooden device proved successful, the two ingenious workers went further. Soon, the device, or its successor, which is made of metal, not only will trim the edges of the fuse boxes, but likewise will have an attachment that does the smoothing or buffing job in the same operation, and then tosses both finished boxes into a container for transfer to the department which will use them.

SEATING AND STAKING hinge assembly bearings for the wing flap done by hand (left) required 12.1 minutes per set until North American employed the device at the right, which seats and stakes in one operation and completes a set of eleven hinges in only seventy-seven seconds.

Minutes were saved on another operation in the machine shop.

In each AT-6, eleven hinge assemblies for the wing flaps are used. In each of these a small bearing must be seated and staked. This job formerly was done by hand. Time for each of the eleven operations was sixty-six seconds, or 12.1 minutes for the whole set. The North American way gets the job done — all eleven pieces in seventy-seven seconds, or seven seconds per operation. And there is no danger of the staking being off, as sometimes was the case when the job was done by hand.

That bit of simplification saved almost eleven minutes on one minor part of the production of each AT-6. And the means by which this was accomplished are simple.

Subassembly Streamlined

The supervisor and the leadman, noting the 12.1 minutes which were consumed each time a man worked on a set of the hinge assembly, began experimenting to find a "straighter line" in the production process. The result of their experiments (and ingenuity) is a small, simple device that can be best described as a gadget. It is shaped something like a midget version of the familiar lug wrench, with a small hinged arm on it. The gadget, with the bearing in its "jaws," is placed under a pneumatic punch, and the hinge assembly properly set. Then, it's "punch!"—and presto! there's the bearing, correctly seated and staked. It takes less time to perform the operation than it does to describe it.

A simple storage rack, on the order of a giant phonograph record holder, was suggested by a worker in the finishing department to prevent scratching of instrument panels in storage or transit. Under the old method, the panels had been separated only by paper, which did not always prevent scratching. The rack, with separate compartments, proved to be entirely worthwhile and was put into use.

In rudder assembly, a conveyor assembly line was suggested and worked out by the men in the department. Until this system was adopted, each rudder was made on an individual bench, and could not be moved until it was practically completed. Now the men work in pairs, and as each pair finishes their particular job, the rudder is moved along the conveyor to the next two-man team. The new method has reduced assembly time on a rudder by 30 per cent.

For a larger operation to which work simplification has been applied successfully, perhaps the best example

TRIMMING FUSE boxes was dangerous and slow (top) before ideas simplified the job. A crude wooden jig (center) trimmed two boxes simultaneously, with safety. But the final version of the gadget (bottom) utilized metal jig which also ejects finished boxes.

is the overall picture of designing the AT-6—a process which affects every subassembly and final assembly as well, of course.

The AT-6 is so designed that it is a composite of several subsections. When each of these sections arrives at the final assembly line, it is virtually complete in itself. Most of the intricate work has been done on the subassembly lines.

Between each of these subsections—the main and aft portions of the fuselage, for example — there are a limited number of "contact points" by which one section is attached to the other. Through standardization of the location of these contact points, it is possible to make changes in one section without necessitating any alterations in the rest of the plane. Recently, it was disclosed that wood aftersections of the fuselage would be substituted for the metal ones that have been used.

Under the old method of production, this one change would have necessitated drastic alterations throughout the entire fuselage. For in the "old days"—and the old days include the earlier years of the last decade—the fuselage was all in one section.

Under the new method, it was possible to design the wood section so the location of the contact points was unchanged, consequently eliminating the need of any change in the rest of the plane.

An added advantage is that the wood portion of the fuselage can be manufactured elsewhere and shipped to the NAA plant. So long as the maker of the wood portion—a furniture firm, for example—has the contact points properly located, the aft section will fit as snugly as if it had been manufactured in the same plant with the rest of the plane.

The same contact point principle is carried out throughout, as between the outer wing and center section, and so on.

Practice Makes Perfect

Because of this "subdivision" of the plane, steady improvements in design are possible, first in one section, then in another. Retooling can be made a more or less gradual process. And through modification of design to permit use of obsolescent tools, the costly practice of discarding tools when changes in construction are made is eliminated. Retooling can be done gradually, without interfering at any time with steady and speedy production.

Another striking example of work simplification is in the training of welders at NAA's Texas plant. Nation-wide prominence has been given the story of the former stenographer, first woman employed in arc welding at the Texas plant, who completed her simplified training course in thirteen days, and passed the rigid Army welding inspection test with flying colors. Training of a welder formerly had been considered a four to six months' job. It was simplification — simplification of training — that cut that training time to a few weeks at most, and to thirteen days for an exceptionally apt student.

The welding process itself has been simplified tremendously. At one time, a welder spent considerable time moving from one station to another. He shifted from welding to metal-fitting and back to welding. And he never was able to become as proficient on either of the jobs as he could have been, had he remained at one task.

Now the men stay in one division of the department. Sticking at the same job steadily, workers provide living examples of the old adage about "prac-

tice makes perfect." They become more and more proficient, thus speeding their individual output. Besides, familiarity with their work often enables them to find shortcuts — Euclid's "straight line" again.

Nine Steps Make a Wing

The story could go on and on. Construction of a wing used to be one long and involved operation. Several men — all workers who had to have long training — did their jobs in the same restricted area. Often one had to wait until another moved from the job he was doing, as so many men in a comparatively small space frequently got in one another's way. Now construction of a wing has been broken down into nine operations, of which seven themselves have distinct subdivisions.

Safety was the motive behind another suggestion. In the sheet metal department, the front of a band saw was open and unprotected, creating a serious hazard to the operator. One employe suggested installation of a curved shield of plexiglass in front of the saw. Adjustable in height, and covering all of the blade except the actual cutting portion, the guard eliminates the hazard, while still permitting full vision of the work being done.

In sheet metal subassembly, a substitution of a power-driven self-operating mixer cut operating time from one hour to fifteen minutes on mixture of acid etchant powder prior to welding. Previous method had been by hand. In this same department, application of the "assembly line" technique, as suggested by a worker, decreased handling operations and increased production on one part, top rail fabrication, lowering the time required for the series of operations by 40 per cent.

Workers' Suggestions

A simple testing device designed by an employe in the inspection department made checking of the antenna relay switch on the radio installation "almost automatic," as the foreman expressed it. Time saved was ten minutes per part.

An inspector in the finishing department wondered why it was necessary to paint a cadmium plated part which was visible in the cockpit. Cadmium plated parts do not require paint for protection, and painting necessitated an extra operation of cleaning so the paint would hold. In addition, much of the paint was chipped off through handling before a plane completed final assembly. The plated parts were acceptable in appearance without painting, so painting was eliminated — at a saving of five minutes per plane.

SIMPLE SHORT CUT is "rabbit twister" for loading nuts on rods for Magnaflux, which eliminated hand-sorting and stringing. The strong wire, with one end looped and the other forming a handle, is turned in the bin and picks up the pieces and pushes them up the stem. Transfer to the rod completes the task.

A simple hand tool designed by a worker in the electrical department as a substitute for pocket knives formerly used in stripping insulation from the end of wires eliminated the danger of cutting into the wires themselves, and proved much more easily used by a new operator.

For a burring and polishing operation in the sheet metal department, the hand operation required five minutes' time. A worker devised a special belt sander which cut the time of the operation to one minute, thus saving four minutes per plane.

Training Simplified Also

In the inspection department, a device described by the foreman as "simple but ingenious" was designed by a worker. The old method of testing a generator made it necessary to remove the generator terminal box to get at the lead wires so they could be attached for testing. After the test, the cover had to be put back on, and the screws reassembled. Time required for this operation was five minutes. The device perfected by the worker has lead wires bent to correct shape so they could be inserted through the hole, on the side of the terminal box and hooked over the terminals. Springs on each wire keep the tension so the connection will be good. The operation, under this method, requires less than a minute, a saving of four minutes per plane.

Time required for a simple measuring operation on data charts in the machined parts and cables section of subassembly was reduced 75 per cent through adoption of a worker's suggestion for use of a template as a guide for locating necessary markings.

A simple jig designed by a worker in the fuselage rear surface department eliminated possibility of errors in marking the center of formers prior to drilling rivet holes.

Two minutes' time per plane was saved in one operation on final assembly through use of a special wrench designed by a worker.

Training a worker for the "doping room" once was a long process. Minimum time allowed for such training was eighty hours. At NAA's Texas plant, a raw recruit — barber, butcher, cowhand or clerk — can be taught the job now in a few hours at most. The foreman of the department, faced with the necessity of finding a simplified course of training, designed an easily-read chart which actually "draws a picture" of the entire process for the novice.

This same foreman sums up the whole story in a few words that tell, better than any high-flown phrases, why the workers are winning their wings in their newest undertaking, aviation. Declares this foreman, who, incidentally, came from California:

"These boys and girls like to work, and they like to do their job better and faster than anyone else. They get the job done at a speed that was considered impossible a few years back. It's hard to realize they were cowboys and clerks and farmers a short time ago. They're not clock-watchers, they're not loafers, and they're a fine bunch of fellows besides."

Coming from a Californian, that's a tremendous tribute.

Eastern Aircraft Production Council Organized with G. W. Vaughan as Leader

Aircraft manufacturers who operate plants east of the Mississippi have organized a non-profit corporation known as the Aircraft War Production Council, East Coast, Inc., to pool their combined resources for maximum production. Officers are G. W. Vaughan, president of Curtiss-Wright Corporation and leader of the movement to organize, president; Glenn L. Martin, president of the Glenn L. Martin Company, vice president, and J. M. Scanlan, assistant secretary of Curtiss-Wright, secretary and treasurer. Temporary headquarters were established at 30 Rockefeller Plaza, New York City.

Member companies, in addition to Curtiss-Wright and Martin, are the Aviation Corporation, Bell, Brewster, Fairchild, Republic and the eastern aircraft division of General Motors. Heads of the firms are directors of the council. They are Victor Emanuel, Larry Bell, C. A. Van Dusen, L. C. Goad, (General Motors), J. Carlton Ward, Jr., Ralph S. Damon and Vaughan and Martin.

Committees of the Council are as follows:

Production—T. B. Soden, Martin, Chairman; William F. Wise, Aviation Corp.; L. L. Benson, Bell; W. A. Bates, Brewster; John Lee, Curtiss-Wright; C. S. Swayze, G. M.; Philip Harr, Fairchild; Alfred Marcher, Republic.

Material—Arthur Peck, Republic, Chairman; P. E. Garlent, Aviation Corp.; N. T. Shaw, Bell; G. A. Schwoble, Brewster; Frank Maley, Curtiss-Wright; O. C. Mueller, G. M.; O. R. Perkins, Fairchild; T. J. Dunnion, Martin.

Engineering and Standards—E. L. Zivi, Martin, Chairman; W. B. Griese, Aviation Corp.; Harlan Poyer, Bell; R. D. McCart, Brewster; H. E. McDonald, Curtiss-Wright; W. J. Tell, G. M.; Armand Thiebolt, Fairchild; Wendel Miller, Republic.

Industrial Relations—D. W. Siemon, Martin, Chairman; C. W. Bishop, Aviation Corp.; V. Bell and D. G. Forman, Bell; E. J. Walsh, Brewster; C. S. Mattoon, Curtiss-Wright; R. E. Waldo, G. M.; E. E. Neubig, Fairchild; W. L. Wilson, Republic.

Public Relations—Avery McBee, Martin, Chairman; H. P. Harris, Aviation Corp.; F. R. Neely, Bell; R. Hill, Brewster; H. E. Lawrence, Curtiss-Wright; J. N. Bird, G. M.; J. E. Lowes, Jr., Fairchild; T. W. MacDonald, Republic.

Plant Defense—E. T. Adams, G. M., Chairman; S. B. Whittington, Aviation Corp.; Paul Grezelle, Bell; H. A. Loughran, Brewster; D. G. Welch, Curtiss-Wright; William Hamby, Fairchild; E. A. Shurman, Martin; Arthur Kelly, Republic.

A service committee, to extend inter-company co-operation to service men and planes in the field, will be named later.

Vaughan issued the following statement in announcing formation of the Council: "It is the object of these companies who comprise the *Aircraft War Production Council, East Coast, Inc.*, to work as a team rather than as individuals, to co-ordinate all work for the war effort, to freely exchange information, engineering data and manufacturing processes that would be regarded in normal times as secret and to pool mutual interests and facilities thereby assuring maximum aircraft production as quickly as possible. Once we accomplish this, we shall be taking a very significant step in increasing America's warplane output.

"The American aircraft manufacturing industry has in the past three record-breaking years caught up with and exceeded the combined aircraft production of the Axis nations. With this new Council and our associate organizations on the West Coast in action, we expect to more than meet the plea of Donald Nelson and the War Production Board this week that we 'produce more . . . faster . . .'"

Aero Chamber Peril Grows with Five Firms Quitting, Jouett Gone

Five West Coast members have been reported as submitting resignations from the Aeronautical Chamber of Commerce, from which Colonel John H. Jouett, president, has also resigned, and efforts to save the important organization were under way. Eight Coast manufacturers recently organized the Aircraft War Production Council and this was followed by organization of a similar unit for the East Coast.

Jouett has become head of the new aircraft division of the Higgins Industries of New Orleans, which has agreed to build 1,200 Curtiss Commandos.

Higgins to Build 1,200 Commandos at New Orleans With Jouett in Charge

Andrew J. Higgins, the New Orleans shipbuilder, entered agreement with the Army for approximately 1,200 plywood adaptations of twin-engined Curtiss Commando transports and Colonel John H. Jouett has resigned as president of the Aeronautical Chamber of Commerce to head the aircraft section of Higgins Industries, Inc.

Construction of the big order will make New Orleans one of the nation's leading producers of cargo aircraft. Newly-built facilities will soon begin delivery of four-motored Vought-Sikorsky cargo flying boats at the New Orleans plant of Nash-Kelvinator, which is working on a large order for the Navy under license from United Aircraft.

Higgins had endeavored energetically to promote planes considerably larger than the Commando, which has a payload of approximately ten tons. He is one of the South's leading industrialists and has carried on intensive research with plywood.

EASTERN AIRCRAFT COUNCIL leaders organized last month to pool efforts in boosting production. Seated (left to right) are Glenn L. Martin, president of the Glenn L. Martin Company, who was elected vice president of the council; Guy W. Vaughan, head of Curtiss-Wright Corporation, and leader of the movement to organize the council, who was elected president; and Victor Emanuel, president of the Aviation Corporation. Standing (left to right) are Omer L. (Woody) Woodson, vice president of Bell Aircraft Corporation; Ralph S. Damon, president of Republic Aviation Corporation; J. Carlton Ward, Jr., president of the Fairchild Airplane & Engine Corporation; L. C. Goad, general manager of the Eastern Aircraft Division of General Motors Corporation; and George Chapline, vice president of Brewster Aeronautical Corporation.

Reid Recommends Wider Training of Women Engineers in Special Twelve-Month Study Course

C. T. Reid, director of training for Douglas Aircraft, told the Fourth Annual Texas Personnel Conference at the University of Texas October 29 that engineering training is one of the aircraft industry's most serious problems.

Discussing manpower needs for the war, Reid said a recent survey of the plans of the eight companies in California showed "a larger number of engineering college graduates desired before the end of 1943 than will likely graduate from the entire nation's colleges without Army or Navy commissions." He said more women should be trained for technical work, recommending special college courses for females covering in one year the "high points of usual pre-engineering studies in mathematics, mechanics and drawing plus a few aeronautics specialties like materials and manufacturing processes."

Texas U. Expands Aero Engineering To Serve Industry

Rapidly expanding its instructional program and research for students and the aircraft industry in the South, the University of Texas at Austin has announced appointment of Dr. M. J. Thompson as chairman of its newly created Department of Aeronautics, which offers a Bachelor's and graduate degrees in aeronautical engineering. With summer work, students can obtain a Bachelor's degree in three years. In addition, the University conducts nearly forty part-time classes and one full-time course in aeronautical engineering in numerous Texas cities, with approximately 1,000 men and women enrolled.

Dr. Thompson formerly served as consultant to numerous aircraft and other industrial organizations on problems in applied aerodynamics. He has studied extensively in aeronautical engineering here and abroad, holding degrees from the University of Michigan and the Warsaw (Poland) Polytechnical Institute. He is assisted by Dr. M. V. Barton, who, while serving on the teaching staff at Cornell University in 1940, developed advanced engineering courses in structures, stress analysis and applied mechanics for engineers of the Bell Aircraft Corporation and Curtiss-Wright Corporation. He also has served on the teaching staff of the University of Maryland.

Other members of the staff at Texas include Harry W. Brown, University of Nebraska graduate, who formerly held a Boeing scholarship and who formerly was on the engineering staff of the Vega Aircraft Corporation, and John C. Bowman, a Stanford graduate, formerly with Consolidated Aircraft in San Diego.

New Allison Called World's Most Powerful Liquid-cooled Engine

According to General Motors, the horsepower of the GM-built Allison engine has been stepped up to the point where this power plant is today "the most powerful liquid-cooled engine of its type in the world". Details are not given.

At the present time, Allison-powered planes number in the "five figures", and are fighting wherever the United Nations have established an air front against the Axis, the announcement stated.

KAISER - HUGHES seven-engine cargo plane was pictured in the Hughes Aircraft Company's house organ by this drawing which shows Hughes' engineer, Ken Ridley, being welcomed back from Washington where he helped sell the government on the big undertaking.

McDonnell Establishes Plastics Division, Adds 245,000-Sq. Ft. Factory

The McDonnell Aircraft Corporation of St. Louis last month established a plastics division, with Charles F. (Charlie) Marschner as manager, and added over 245,000 square feet of floor space for its expanding operations.

The company has developed a laminated paper plastic and says that tests show an experimental wing tip made of the paper material to be stronger than the current production aluminum tip. J. S. McDonnell was project engineer at the Glenn L. Martin Company before he founded his own firm.

Besides saving strategic materials and eliminating much labor in fabrication, the McDonnell paper plastic for aircraft has been described as offering a smooth surface not involving the finishing and coating which metal and wood require. It is said to be more resistant to abrasion and denting than aluminum, is readily adaptable to double curvature forms without special treatment, and its uniformity can be controlled to the advantage of design with slight taper or gauge variations.

The new factory space formerly was a downtown St. Louis automotive garage, advertised as the "world's largest garage."

New Technique Used to Analyze Flutter

Vibration experiments which may help to solve problems of disintegrative flutter at high speeds have been conducted by the McDonnell Aircraft Corporation at St. Louis. Using a technique new to aviation, the motion of an airplane wing during flutter was analyzed by engineers under controlled conditions simulating dynamic flight with varying weight distributions and speed factors, and results were accurately measured, recorded and photographed simultaneously.

"As a result," said the company, "it is now possible to see, record and measure the flutter of wings and other airplane surfaces, simulating almost any conceivable condition which might be encountered in actual flight. Thus the flutter characteristics of newly designed aircraft may be analyzed and more accurately predicated prior to actual construction, thereby eliminating much costly full-scale experimentation and delay."

Details were not given.

Continental's Texas Plant to be Enlarged

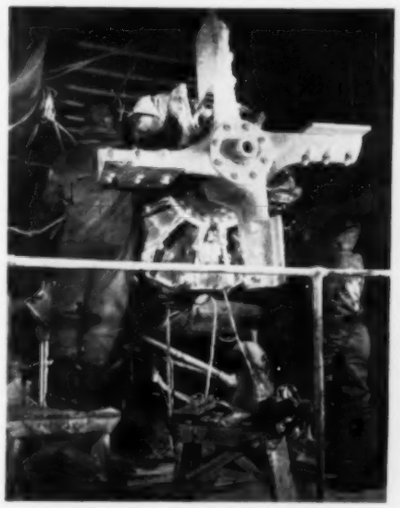
A $600,000 addition to the Texas plant of Continental Motors Corporation at Dallas has been announced by the government. Continental is tooling up the factory for the mass production of Wright engines for tanks.

Globe Operating Own Plywood Plant for AT-10's

In preparation for the inauguration soon of assembly of Beechcraft AT-10 twin-engine trainers, the Globe Aircraft Company has launched a complete plywood division for manufacturing its own wooden fuselages for the contract. Practically all other components are subcontracted on the outside and will feed into the firm's recently-completed factory for final assembly.

Twelve-Day Vacations for Consair Workers

George J. Newman, vice president and in charge of Consolidated Aircraft's Fort Worth factory, has announced a policy of granting twelve-day vacations instead of asking workers to accept pay instead. He said government officials had urged the policy in the interest of sustained war production by furnishing workers vacations away from their jobs wherever possible.



UNDER ICING conditions in tests, these Wright Cyclone engineers are studying the problems of split-second starting and are testing new fuels, lubricants and electrical equipment designed to keep warplanes of the United Nations flying in all geographical areas this winter.

Mac Short (left), vice president of the Vega Aircraft Corporation in charge of engineering, and one of the nation's outstanding aeronautical engineering executives, is the newly nominated president of the Society of Automotive Engineers. Charles W. Morris (center), well known aviation engineer, has joined the staff of AiResearch Manufacturing Company as installation engineer for high altitude cabin equipment. He has been in aviation for fifteen years. Harold P. Wade (right), is the newly appointed general manager of Adel Precision Products Corporation. He formerly was an executive with Chrysler, Packard, Studebaker and Lockheed.

PERSONALS

Tom Girdler's place on the directorate of the Aviation Corporation has been taken by Art Herrington, board chairman of the Marmon-Herrington Company. Girdler, whose time is now devoted chiefly to Consolidated Aircraft affairs, remains a consultant of the board. . . . Herrington, past president of the Society of Automotive Engineers, recently returned from India where he was technical advisor to Col. Louis Johnson on the American economic mission. Trucks of his design and manufacture helped build the Iraq pipeline and he once served as consulting engineer to the Shah of Persia.

George Rentschler, president of the General Machinery Corporation and chairman of the Southeastern Shipbuilding Corporation, and William H. Houghton, comptroller of Bendix, have been elected directors of the Bendix Aviation Corporation. . . . The name of the Missouri subsidiary of United Aircraft, which operates an engine plant at Kansas City, has been changed to Pratt & Whitney Aircraft Corporation of Missouri. Frederick G. Dawson and Leonard C. Mallet, general manager and assistant general manager, have been elected directors.

Francis with PAA

Devon Francis has resigned from *Time* to accept a position as assistant to the director of public relations of Pan American Airways System. He was past president of the Aviation Writers' Association and formerly was aviation editor of the Associated Press.

U. S. Delegation Sees British Air Industry

British aircraft production facilities were inspected early in November by a delegation of eight U. S. aviation industry leaders headed by T. P. Wright, deputy director of the WPB's aircraft production division. They are J. Carlton Ward, Jr., president of Fairchild; P. G. Johnson, president of Boeing; I. M. Laddon, executive vice president and general manager of Consolidated; S. A. Stewart, general manager of Hamilton Standard; Charles Marcus, vice president of Bendix Aviation; G. D. Welty, forging products manager of the Aluminum Company of America; A. G. Herreshoff, chief engineer of research of Chryselr, and Ken Ebel, vice president and chief engineer of Martin.

Jack Frost Enters Army

Jack Frost, executive secretary of the Aircraft Parts Manufacturers Association, last month announced his resignation to enter the Army.

A former pilot, he has been associated with aviation for fifteen years. A pioneer in the days of the old Ford and Maddux airlines, he was later executive secretary to Richard W. Robbins, president of TWA. In February, 1934, Frost took leave of absence and was later assistant to Major R. H. Fleet, president of Consolidated Aircraft Corporation, San Diego. In July, 1940, he organized the Aircraft Parts Manufacturers Association with eight member companies. It now represents 140 aircraft parts processors. His work in this connection has been commended by military and government officials as well as major aircraft companies and subcontractors. Frost hopes to be assigned to the Army Air Force.

Globe Aircraft Company Engineering Staff Listed

The Engineering staff of Globe Aircraft has been announced. It is composed of K. H. Knox, chief engineer; H. H. Epstein, project engineer; J. T. Brooks, production engineer; A. A. Gomez, chief draftsman engineer; C. E. Greenup, salvage engineer; D. M. Mounkes, supervisor blueprint release control; John Stanley Babin, engineer, group leader, powerplant; Dale Dow, engineer, group leader, wings; Raymond F. Rawson, engineer, group leader, rear fuselage; Fred Kuhlman, engineer, group leader, radio electrical; Edwin H. Polk, engineer, group leader front fuselage; William A. Schmitz, engineer, group leader, landing gear; Carl Hadra, draftsman, assistant group leader, empennage; Thomas Logan Heberle, engineer power plant, assistant group leader; William A. Gilmore, engineer, assistant group leader, rear fuselage; Byron Robbins, assistant salvage engineer; and Roy H. Browning, engineer, assistant group leader, equipment and furnishing.

Stocks of Aircraft Steel Increased by WPB Order

The Aircraft Steel and Supply Company at Wichita, Kansas, has received notification of an additional allotment on critical steel earmarked for aviation contractors and subcontractors. The allotment was ordered by the WPB in order to relieve shortage and to assure delivery of material which has been virtually impossible to deliver the past few months. Aircraft Steel's branch warehouse at Fairfax Field, Kansas City, was also given an additional quota on commercial steel tabbed for the aviation market. The firm has long been one of the most essential and largest suppliers in this territory, and these allotments will aid the buyers in the Central and Southwest areas in obtaining severely needed critical steel.

Jordanoff Organizes Company

Assen Jordanoff, noted flyer and aeronautical author, today announced the formation of Jordanoff Aviation Company, with headquarters in New York City. Among the activities of the new organization will be the preparation of illustrated technical aviation manuals to be used for instruction in aircraft flight and also in aircraft maintenance.

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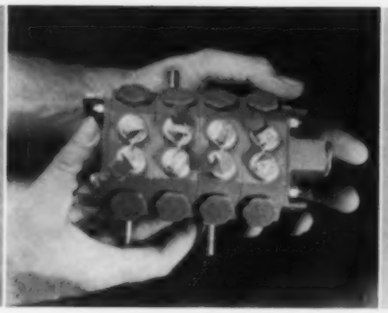
NEW PRODUCTS

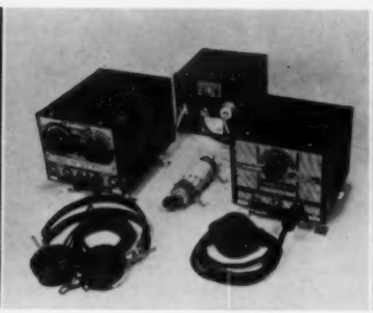
Improved Cable Splicing Holder

A new improved universal quick-adjusting cable splicing holder for cable sizes from one-sixteenth-inch to seven-thirty-seconds-inch without the use of adapters has been announced by Patrick-McDermott & Company of Los Angeles. The thimble or bushing and cable are held in a firm position by using only two adjusting screws. A thimble holder adjusting screw gives direct contact to the self-seating thimble socket. Turning the thumb screw instantly places the splicing holder in a rotating or rigid position.



Stacking Midget Hydraulic Valve

A "stacking midget" valve has been announced by Adel Precision Products Corporation to permit installation of multiple hydraulic controls in limited space. The quadruple unit measures only five and thirty-one thirty-seconds inches by three and three-sixteenths inches by two and seven-eighteenths inches over all and weighs only 2.9 pounds and individual valve assemblies may be replaced or repaired by breaking only the two cylinder lines affected. Fitting as a single body, any number of units may be clamped together by means of "thru" bolts.



New Ranger Radio Set

New two-way Ranger aircraft radio by the Electronic Specialty Co., consists of three separate units for ease of installation and includes a Model 503 power supply operating from the airplane's battery, a Model 110 receiver with both the 195-410 kc band and a "spot" frequency pre-tuned to 3105 kc, and a Model 208 10.5 watt output transmitter operating on 3105 and 6210 kc. Weighing only nineteen pounds and two ounces, the set has proved useful to CAP pilots. Flexible cables permit much flexibility in installation.

New 17-ton Wing Jack

The Whiting Corporation of Harvey, Ill., has announced the MHW-17 seventeen-ton wing jack, a tripod type, two-stage hydraulic jack for checking landing gear operation and for wheel or true changing. It is collapsible for easy shipment and designed to ample proportion for use with practically any plane under all service conditions. It is equipped with retractable casters and may be easily moved manually or by tractor, having a special towing hitch ball. It is also available in a ten-ton size.

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Radial Spot Welder

A radial-type gun spot welder, P-1-R, is now being offered by Sciaky Bros., 4915 W. 67th St., Chicago, in both stationary and buggy-mounted units. It is equipped with a special Sciaky welding timer and operates on single-phase A-C, 220 or 440 volts. Hydraulic pressure is supplied by a hydro-pneumatic booster, which can feed a gun able to supply a maximum electrode pressure of 1,800 lbs. with ninety psi of air supply. Fixed or crowded jigs can be easily reached with the portable buggy-mounted welding gun. The maximum area reached by the stationary unit is represented by a circle of twenty-one feet diameter.

Metal Coating Contest

In the interest of industrial conservation, and to help speed war production, Metallizing Engineering Co., Inc., is offering a total of $650 in War Bonds for details of maintenance and salvage procedures with the metal spraying process. First prize is $250, second prize $150, third prize $100, and three prizes of $50 each. Contest closes December 15. Complete information and entry forms are obtainable from Metco News, 21-07 41st Avenue, Long Island City, New York.

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Special Transformers

The General Electric Company announces a line of three-phase to single-phase transformers specially developed for use in aircraft. They provide a single-phase, 115-volt or twenty-six-volt power supply from a three-phase, 400-cycle generator, without disturbing generator-phase voltage. Transformer, Cat. No. 68G447, has been specially developed for operating the radio compass and indicator lights. It is a 400-cycle transformer operating from a 115-volt, three-phase generator. The transformer supplies 115-volt amperes at 115-volts, single-phase, to the radio compass and five-volt amperes, single-phase, to the 0.19-amp, T-1¼ indicator lights. These transformers operate satisfactorily in an ambient temperature range of plus 60C to minus 35C. Operation is not affected at altitudes from sea level to 35,000 feet.

Angle Drilling Heads

Wyzenbeek & Staff, Inc., Chicago, manufacturers of WYCO Flexible Shafts and Power Tools, announce a new line of "junior" size angle drilling heads designed for production drilling, countersinking, etc., in close quarters. These new WYCO Angle Heads are used on a flexible shaft or flexible shaft extension of a portable electric drill. They come with ninety degrees, forty-five degrees, thirty degrees or universal heads, have over-all diameters of one-half inch or three-fourth inch and are today widely used in the manufacture of aircraft. They have been designed and are built for heavy duty operation.

NEW LITERATURE

Aero Tool Company, *231 West Olive Street, Burbank, California,* has issued a 1942-43 Catalog of Cupforged, Comparameter Inspected, Microglass Polished precision aircraft tools developed by this company in co-operation with leading aircraft manufacturers.

Tubing Seal-Cap, Inc., *215 West Seventh St., Los Angeles, California,* has released a nine-page booklet on "Tubing and Pipe Protection Methods." Gives thirteen reasons why Seal-Caps and Seal-Plugs are a most effective method of protecting and sealing tubing, threaded fittings, and hydraulic units.

★ ★ ★

Lockheed production experts state that two men, a riveter and a bucker, should do 125 rivets an hour, or 1,000 rivets in an eight-hour day. There are 1,750 rivet hours in a Lockheed Hudson bomber.

Low Tension Cable

A new series of Auto-Lite Sterling low tension aircraft electrical cables known as "B" Braid Synthetic has been announced by the Wire Division of the Electric Auto-Lite Company, Port Huron, Michigan. According to its makers, the new "B" Braid Synthetic construction offers the finest combination of all-around physical and performance characteristics in Auto-Lite Sterling history. The insulating compound is a synthetic, protected special "B" type cotton braid, with a newly-developed lacquer of unusual abrasion resistance. Complete data on stranding outer diameter and weight, as well as comparative data on abrasion resistance, are available in Auto-Lite Sterling Catalog No. 838.

BOOK REVIEWS

New Commercial and Technical Dictionary, *published by Chemical Publishing Co., Inc., 234 King Street, Brooklyn, N. Y.*— Compiled by Antonio P. Guerrero, this reference work is a result of many years of planning. Very extensive changes have been made in recent years in the Spanish language. Many new words and their meanings, both Spanish-English and English-Spanish are listed which were not in existence a few years ago. Each word has been carefully translated in accordance with the plan of the Royal Spanish Academy of Languages.

Planned for the engineer and technician, there has been included all needed modern words referring to Mechanics, Mechanical Engineering, Aircraft, Aviation, Plastics, Meteorology, etc. Each definition includes as much information as possible.

The De Luxe Edition, thumb indexed, morocco finish, flexible binding, lettered in gold with full tinted edges is priced at $10.00.

Flight Instructor, *by Charles A. Zweng. Published by Pan American Navigation Service, 12021 Ventura Blvd., North Hollywood, California. Illustrated, 480 pages. Price, $4.00.*

This third revised edition of "Flight Instructor" has been prepared by the author as a means of assisting pilots for rating as flight instructors, and is based on the general outline of the curriculum recommended by the Civil Aeronautics Administration.

Beginning with a brief history of aviation, the text carries the student step by step in logical sequence from aerodynamics and on through the fundamentals of flight training. Primary and advanced maneuvers are fully covered and illustrated, and a full chapter is given on cross-country flying.

The book is splendidly indexed and we note for the first time new words and descriptive phrases, such as "shading of pressure," "control touch," "subconscious coordination," etc.

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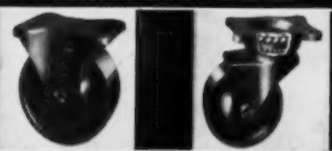

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AIRLINES

C. P. Shropshire (left), traffic manager of Vultee's Nashville division and formerly with Pennsylvania Central Airlines, has become director of traffic and transportation for the Army Air Forces. Amos Culbert (right), vice president and general counsel of Chicago & Southern Air Lines, has resigned to become vice president of American Airlines on December 1.

PAA Observes Fifteenth Anniversary

Pan American Airways on October 19 observed its fifteenth birthday with a record of transporting approximately 2,350,000 passengers and a log of 161,000,000 miles since the opening of its ninety-mile "international" operation between Key West, Florida, and Havana. Details of PAA schedules and operations in wartime air transport have been withheld, but the company is maintaining service in sixty countries and colonies and even within the combat zone in some places. It has been credited with pioneering the technique of over-ocean flying, including the perfection of multiple-crew system, the development of multi-engined ocean-going planes and the establishment of numerous international routes, the last of which were a trans-South Atlantic line to Africa and a landplane line into the Dark Continent's interior at the government's request.

TWA Aids Modification

In order to speed planes from aircraft plants, a crew of TWA experts is utilizing airline equipment and skill under supervision of the Army Air Forces in operating a modification center at Kansas City. The project not only clears factory flight ramps but expedites the installation of special combat equipment on craft bound for varying climes along the war fronts.

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Aircrafters Supply Auto Industry Research Data

A survey just completed by the Aircraft War Production Council, Inc., shows that aircraft plants in Southern California have turned over 182 engineering research reports to Eastern Aircraft and automotive companies in the past six months. Members of the Council are Consolidated, Douglas, Lockheed, North American, Northrop, Ryan, Vega, and Vultee.

In addition to these reports, the member companies of the Council have made hundreds of emergency loans or sales of material and parts to help other industries over shortages which might have slowed down production. Engineers—among the greatest of shortages today—have been loaned to other industries to help them get into production. Blueprints and even complete subassemblies of planes have been made available through the Council's procedure to other companies.

Fast Calculator of Loading Balance Devised by Consair Engineer

The "Bal-o-Dial," a simple, efficient and inexpensive device, that will make of every airplane pilot a lightning calculator for computing the loading balance of his plane has just been perfected by S. H. Avery, engineer at the Consolidated Aircraft Plant, at San Diego, California.

The proper loading of an airplane is necessary for safe flight. But heretofore computing the center of gravity has been a job requiring the services of a mathematician, a French curve, a slide-rule, three books of logarithms, a magician and a month of Sundays—or at least so it seemed to many pilots. Now, with the Bal-O-Dial, a pilot can compute it in the matter of a minute or so.

The device, designed for all models of airplanes, takes into consideration every object that goes into them—pilots, cargo, gasoline, oil, bombs and ammunition. The pilot does not so much as need a piece of paper and a pencil to arrive at his plane's load and its point of balance. He can even make computations in flight. A Bal-O-Dial can be made for each type plane.

The problem is not as simple as it might sound. It is necessary to find not only the center of gravity but the center of the wing lift. These must be brought into the direct relation so that the plane flies at the most efficient angle. It used to be that little attention was paid to the loading of planes, but now that long range is so essential it is very important to attain a proper poise.

If the tail is overloaded, as was formerly the rule, it means the plane has to "mush" through the air, which is to say there is much more air resistance than in proper flight. It is now possible, with the use of Bal-O-Dial, as the fuel on a long flight is consumed, for the pilot to compute weight shifting to compensate.

One of the early computers for establishing the center of gravity was an elaborate machine which cost $300. Next was brought out a slide-rule type which required time, pencil and paper, and did not have all the features of the Avery invention.

Name Changed

The board of directors of the Colgate-Larsen Aircraft Company has announced that effective November 1 the name of the company was changed to Colgate Aircraft Corporation. It is located at Amityville, Long Island, New York.

BIG ENOUGH for three men to stand in, the hole in the trailing edge of the starboard wing of this Lockheed Hudson was caused by an anti-aircraft shell while she was bombing a German convoy off the Dutch coast. Nevertheless, she flew back to her own airfield in England and made a perfect landing.

Colored Tools Boost Efficiency of Workers

The foremen and leadmen at Fleetwings aren't complaining about misplaced tools anymore. This problem was solved by a plant superintendent, by the use of colors. By assigning one color to each jig, and painting the tools assigned to that jig the same color, he solved the problem of keeping the tools by the jig to which they belonged, and, by so doing stepped up efficiency considerably. At the end of each jig is a neutral painted board, with the outline of each tool painted thereon in the color assigned to that jig, on which tools are hung when not in use. Therefore, if a red tool is hung where a green tool should be, the transfer can be made immediately.

New Parts Firm

Announcement has been made of the formation of the Aircraft Parts Development Corporation, with offices, laboratories, and shops in Summit, New Jersey. It will handle research and development work on parts and materials for the aircraft industry, especially in the fields of fastening devices, powdered metals, and plastics. It is planned to solicit ideas and untested projects from engineers and inventors, and to carry them through complete development to the point of release for commercial manufacture. The activity will extend to the designing and tooling of any special machinery required for the manufacture of products evolved.

Champion Reduces Prices on Aviation Spark Plugs

Substantial reductions in the price of Champion ceramic insulated aircraft spark plugs have been announced by Duane Stranahan, vice president of Champion Spark Plug Company. Manufacturing economies and sharply increased demand for both governmental and civilian use are responsible for the reductions which on the civilian plane type plugs average 20 per cent, Stranahan said. Included in this category are the shielded and unshielded 18 mm. spark plug, the 14 mm., and the C-10-S.

Heavy Bomber Output Shows Sharp Increase

A ten per cent increase in aircraft production during September, compared with a five per cent boost for August, has been reported by Donald Nelson, WPB chief. Four-engined bomber output was "very nearly on schedule" after a marked increase, he said, but light plane deliveries decreased.

Thus far, Nelson reported, enough propellers have been made to fly all planes, but "plane production may increase in the months ahead more rapidly than propeller production, unless propeller output can be greatly increased."

Army Maps Aids for Flight Contractors At Annual Conference

Representatives of all of the nation's primary flight contractors to the Army, conferring in Dallas, October 22-24, with Air Forces leaders, including seven generals, were given assurances of greater co-operation by the Army and heard Major General Barton K. Yount, chief of the AAF Flying Training Command, describe the civilian schools and their operatons as having provided the "backbone of Army flying."

Deferment of instructors, provision of housing for school operations and many "off-the-record" plans were discussed during the conference. Oliver Parks, president of Parks Air College, and retiring chairman of the conference, said afterwards that it was the opinion of "both military and civilian representatives that much good was accomplished and that better schools will be conducted from now on." B. L. Woolley was co-chairman.

Army leaders attending in addition to General Yount were Major General Hubert R. Harmon, commanding general of the Gulf Coast AAF Training Center; Major General Ralph P. Cousins, commanding general of the West Coast AAF Training Center; Major General Ralph Royce, commanding general of the Southeast AAF Training Center; Brigadier General Walter F. Kraus of the AAF Fying Training Command; Brigadier General William Welsh of the Southeast center, and Brig. Gen. Martin F. Scanlon of the West Coast center.

General Yount called names in praising the flight contractors, designating as "patriarchs of the Army training program" seven of operators attending. They are Maxwell Balfour of Tulsa, Oliver Parks, Hall Darr of Florida, W. F. Long of Dallas, G. Allan Hancock of Santa Maria, Calif., Earl Prudden of San Diego, and C. C. Moseley of Ontario, Calif.

Prudden was selected general chairman for the next conference, to be held in April at a site to be chosen later. He will designate two other operators to work with him.

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All Chennault Needs to Hit Japan Is Bombers

Major General Claire P. Chennault, commander of the AAF in China, is in a position to bomb Japan from China if he is supplied with proper aircraft. Capt. P. E. Pihl, who accompanied Wendell Willkie on his recent air journey, said Chennault told him that lack of planes was the only factor preventing such operations from recently-recaptured air bases in Chekiang province.

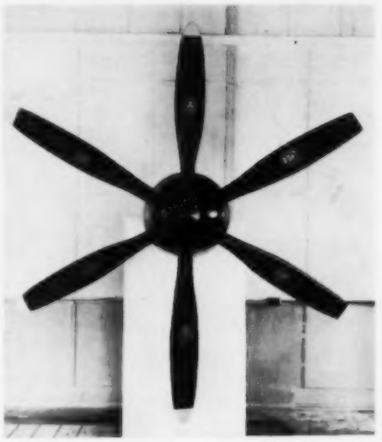
Denver Library Adds Aeronautics Division

As a result of the numerous demands by high schools and colleges, the public library of Denver, Colorado, has established a division of aeronautics, with William E. Barrett as consultant. Hundreds of volumes of the Maggs collection of early aeronautics obtained from London, form the research background for the new division. Mr. Barrett has a private library containing more than 800 books and 2,000 photographs. He is aeronautical reviewer for the Boston *Post*, and has written for a number of popular magazines. Mr. Barrett has been a pilot for several years, and is an honorary member of the Fiftieth Squadron Association.

726 Aero Students at Texas A. & M.; Student SAE's Receive Charter

One of the nation's largest enrollments in aeronautical engineering is claimed by Texas A. & M. College at College Station. Dr. Howard Barlow, head of the department, reports 726 students are taking aeronautical engineering.

Last month the school's student group of the Society of Automotive Engineers, sponsored by the Texas section of the SAE, received its charter in a special meeting from Hollister Moore of New York, SAE manager of sections and membership and staff representative for student activities. W. I. Truettner, faculty advisor, accepted the charter. Charles R. Ursell, chairman, presided over the session, and introduced W. E. Lind, engineering assistant to the executive vice president of the Guiberson Diesel Engine Corporation, who represented Allen Guiberson, chairman of the Texas section of the SAE. Officers of the student group, in addition to Ursell, are Frank R. Young, vice chairman; David S. Kauffman, secretary, and J. N. Hoss, treasurer.



FIRST SIX-BLADED dual rotation airplane propeller to be built about the principle of electric control of the pitch of its hollow steel blades and especially designed for 2,000-h.p. aircraft engines announced by Curtiss-Wright Corporation's propeller division. Several are being delivered to the Army Air Forces for installation on fighter planes to increase speed and efficiency at high altitude.

Military Ferry Planes Return with Vital Cargo

Army and Navy ferry planes now are bringing strategic material to America after delivering personnel and material to fighting fronts.

Block mica has been flown from India. In eight weeks, thirty-two tons of bristles, seventy tons of silk, forty-seven tons of tin, and seventy tons of tungsten were moved from China to India. Later, ninety-eight tons of tungsten were flown out in ten days. American planes brought $475,000 worth of platinum from points on the Persian Gulf to the United States. Other materials that have been moved or which plans are being made to move are: Balsa wood from Central America, needed for American gliders and British mosquito boats; tantalite, beryl ore, quartz crystals, industrial diamonds, and mica from South Africa; Crude rubber from Brazil; and twenty tons of rubber seed from Liberia for planting in the Western Hemisphere.

Strato Junkers Reported

A German Ju-86P, equipped with an experimental pressure cabin and turbo-supercharged diesel engines, has dropped small bombs on England from an altitude of 40,000 feet, according to the London *Sunday Times*.

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New CPT Program Starts

A new CPT program started the middle of last month with twenty students — ten Navy and ten Army. The previous program, also composed of ten Army and ten Navy students, passed with good grades and have gone to advanced schools. The Navy students went to Athens, Georgia, and the Army students went to Shawnee, Oklahoma.

Mr. Hasty, who owns the airport in Ardmore, has bought the airport from Mr. Carter of Coalgate. He took over the middle of last month.

Mr. Lyde, who has been instructing here for the past year, has gone to Bonham, Texas, to instruct Army primary. Andy Canalis, mechanic, has gone into the Army. Both men have been replaced.

Mr. Slack Browning, who has been chief pilot here for a long time, is going to Brady, Texas, to instruct Army basic. Mr. Hasty is going to get a NYA school here.

DON MOUNT

Enlist in your CIVIL AIR PATROL

Dallas, Texas

Night Ground School Classes at Mustang

Love Field—This field is as quiet as a hornet's nest. The airlines, the Command, Southwest Airmotive, Air Associates, and Dallas Aviation all contribute to the inactivity, and five will get you ten that it keeps getting more so . . . Dudley Rider came down from Wright Field and joined the bunch at Lockheed for coffee . . . We all sat and heard about "Andy" Burke's exploits over the globe from Curry Sanders . . . Marion Guiberson (Mrs. Allan) is the new dispatcher for Lockheed, and is turning out a mighty fine job. She's no "powder puff pilot"!

Jeff Green and R. Millsap conferring . . . Weldon Williams flying all over the map for Air Associates . . . Bill Campbell working like a beaver . . . "Pup" Thomas with C. L. Harris in a nice little red number flew up from Lubbock to have words about CAP business . . . Sgt. Oliver Thomas down from Sheppard Field to check the bright lights . . . We're expecting J. D. Jenkins from Lubbock any day now.

A sure enough major general of the British Air Staff was at the Terminal on his way back from the desert on to the East . . . Major General D. H. Pratt . . . very resplendent with his red and gold braid.

Curry Field—Clifton Le Van phoned us and reported that he and Leonard Decker are instructing at Okmulgee now, and that Jack Stone is at Vinita giving out brain power. Also, that J. Howard Smith is at Terrill, teaching . . . and Lawrence Schell is turning out pilots as fast as he can. If you find an extra four bits with nothing to do, fly over and see the P-40 Lawrence has staked out . . . it's a true killer and scares everybody . . . Lawdy!

Mustang Field—Mrs. Celia R. Hutchinson is the new Navy primary instructor giving forth out here . . . "Jo" Alcorn wrapping up the same deal . . . Ed Reynolds, Jr., watching his first batch of students playing football in the rain, observed that they shore did do well on the ground . . . Bill Lowdon agreed concerning his own studious scholars. They have all had about six hours which might explain something.

Mr. Keagan reports that for a very few simoleons starting any Monday you can join a night class teaching ground school from CAR to a Commercial license. Three nights a week and you can whip the exams with ease . . . "Jo" Alcorn dishing the dope.

Lou Foote Airdrome—J. M. McLean is boning for an instructor's rating and was looking sad at the rain coming down in small buckets . . . Instructor G. W. Rea, who had been up in Omaha, Nebraska, allows that he's mighty glad to be back with the home folks . . . Mrs. Ivelle Foote, who is the prettiest little dish of tea we've seen in many a day, has won a cup for wisecracking at the switchboard. In fact, she is the champion fast talker in South Dallas.

Hudson Airport—"Mac" Smith is a very good man with a deck of pasteboards, and he has some very good competition. One day last month there was a very fast game of hearts being played in the hangar, on account of the wet, wet weather. Ole Jelly Cloud sat in with Jack Barr, H. Kenny, Jr., E. A. Saba and J. B. Jordan. Next time it rains just come on out . . .and bring a cup of sugar.

Hampton Airport—W. Arrendondo, "Crosswind" for short, was the first one to fly after the rains came . . . and didn't get muddy 'tall . . . Ethel Kirk is head gal about the Clearance office . . . Harold Jandebeur, USN (Cal.), Collins Frederick and Enid Barron, CIVS, while they advise Vernon Mitchell on landings. Record Breaker Aycock, USN, is the only man to leave with sixty-five HP and return with more . . . How much HP does a tractor have? Seems he had a forced

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landing and the farmer didn't want him to walk home . . . did the farmer have a dotter?

E. L. Sigmier, "B" Liner, who flies the north end, is aiding J. F. Murphy to win his wings in order to join up with the Navy. Sure was muddy weather but DeWitt Bishop made his commercial ticket.

White Rock Airport—That jiving jeep caught up with "Tony" Anthony . . . H. H. Hetherington . . . Dick Fender (professor, ahem!) while they were weathered in at the clearance house . . . very sadly report that they were deep in the middle of a bridge game and we acted like a true dummy in getting a hand . . . which was bait—pure bait . . . how they can check a no trump . . . So the news is that Instructor Hinkely is a new papa . . . baby girl.

TONY HAGMANN

Enlist CIVIL AIR PATROL in your

Kansas City, Missouri

High School Teaching Airplane Construction

Student Notes — Airplane construction is being studied by Kansas City high school boys as a regular aeronautics course. . . . Included in the current civilian pilot training program at Junior College are two glider pilot courses, open to men who have been rejected by the Army Air Corps because of slight physical defects. The age limit is twenty-six to thirty-six for these men. Ong Aircraft Corporation at Old Richards Field is in charge of instruction of one group; the other is under instruction at the Charles Toth Flying School on the Municipal Airport. Ground school work is given at the Junior College. . . . The former Epperson forty-eight-room home was given to the University of Kansas City last month. This Tudor-Gothic mansion now houses military aviation cadets who are taking a sixty-day ground school course at the University.

Personal — The new president of Rearwin Aircraft and Engine Corporation, Fairfax Airport, Kansas City, Kansas, is C. H. Dolan, a veteran pilot in World War I. . . Seen last month were Maj. Gen. Harold L. George, commanding officer of the ATC and Col. Lawrence G. Fritz, operations officer of the Command. The Grandview airport was among the places viewed on their tour. . . . Wm. E. Kline, former superintendent of airways at Kansas City, has taken the job of CAA manager of this area. Leonard W. Jurden, former manager, has been called to active duty with the Armed Forces.

Women in Aviation — As their November meeting program the Kansas City Unit of the Women's National Aeronautical Association have chosen an official WAAC speaker. The dinner meeting will be open to both men and women interested in knowing details concerning the WAAC program. One of the members of the Unit is Lieut. Doris Jane Leeds, WAAC, now stationed at Port Des Moines, Iowa.

MARION MELCHER

Enlist CIVIL AIR PATROL in your

Lawton, Oklahoma

CAP Joins Scrap Metal Drive

Dorothea Walker, your former local correspondent, has accepted a civil service position with the Navy at Corpus Christi, Texas, and is going to become a ground instructor on a Link trainer for the Navy flying boys.

The local CAP joined the statewide search

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for scrap metal last month, the idea being to locate old, discarded, farm machinery, which had been abandoned in distant corners of fields and consequently overlooked. All of the observers and pilots reported a most successful trip.

Carl Stephens has practically moved to the airport since he bought his Taylorcraft, but he, too, has been lured away by a pair of bright and shiny wings, and will report next week to an Army field for instructor training.

With private flying being held to a minimum because of the extensive government training programs, people with the yen for flying are buying planes of their own. Dr. Howard Angus and Glen Powers purchased a Taylorcraft from Robert Van Zandt who is now on foreign duty. Robert Schlicker, S. P. Banigan and Russell Morse bought Lawrence Archer's Taylorcraft, and R. D. Egren and C. E. Heydock purchased a side-by-side Taylorcraft from Duane Huscher.

At the present time there are twenty-eight students flying in the liaison class, with twenty-two new students ready to start immediately. And then there are the ten Navy CPT students in training. Perry Seddon has finished his course at Duncan, and is now back in the fold instructing a liaison class.

L. O. Carroll flew the Renick-Carroll Porterfied back to Fort Riley, Kansas. Mr. and Mrs. E. E. Kearns, flying a Cub 65, stopped briefly at the local airport on their way from Pecos, Texas, to their home in Erie, Pennsylvania.

JULIA SAPP

Enlist CIVIL AIR PATROL in your

Orangeburg, South Carolina

Hawthorne School Steps Up Training

Completion of its first year of service in turning out fledgling pilots for the Army Air Forces was marked by the Hawthorne School of Aeronautics with no other ceremony than a stepping up of its already fast-moving training curriculum. A year ago last month, the first contingent of Air Forces cadets arrived at Orangeburg from Maxwell Field, Alabama, to start their training as Army combat pilots. Since that time, not only the members of the first class at Hawthorne, but members from other classes which came subsequently have already met the enemy and established enviable records in combat over the skies of Europe and the Pacific.

This first year has been marked mainly by continual expansion, both the school building area and the air field having been enlarged. At the same time Hawthorne Field, which was farm country hardly a year ago, has been enlarged to major proportions and two new auxiliary fields for practice landings have been included within the twelve-mile practice area surrounding Orangeburg.

For several months the school has led in safety as well as efficiency. During the twelve-month period, the Army trainers at Hawthorne flew over 3,500,000 miles with only one accident which resulted only in minor injury to a cadet.

Enlist CIVIL AIR PATROL in your

Mexia, Texas

Municipal Reports Busy Month

The Mexia Municipal Airport has done a tremendous amount of business during the past month. Instructor Roberts has several new students from Teague, Waco, Marlin and Houston. From Mexia we have several students who are expected to solo very soon. They are: Miss Ruby Popejoy, Mr. Yandell, Mr. Howard, Mr. Couts, Mr. Davis, and Mr. Easterling.

Mr. Roberts recently made a trip to Virginia, Minnesota, and brought back a S.M. 8-A Stinson. Several Mexia pilots already have obtained their horsepower rating in it.

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You must be an American citizen between the ages of nineteen and forty-five years with not less than three years of high school.

You must have 300 hours flying as pilot of heavier-than-air aircraft as follows: 100 hours solo; 100 hours must have been in aircraft with engines of 200 or more horsepower—at least 50 hours of which were flown alone; and 50 hours must have been within twelve months preceding date of flight test.

You must have: CAA "Commercial" license with minimum 0-250 horsepower rating, validated; three letters of recommendation; written release from employer of prime contractor thereof (if previously employed by defense agency, U. S. Government, or Canadian Government).

You must be able to pass flight test as given at this station.

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Phoenix, Arizona

Local Inspector Commissioned Captain

Phoenix flyers have said "adios" to C. D. Doak, for four years senior aeronautical inspector here for CAA, who's been called to active duty as a captain in the Army Air Force and left recently for Wright Field . . . Captain Doak was commissioned as a pilot during World War I, saw overseas service, has about 5,000 hours in the air . . . Temporarily in charge of the Phoenix CAA office is C. A. (Al) Le Fevre, another veteran pilot with a wide background in commercial flying . . . Incidentally, another case of "like father, etc.": Captain Doak's son, David, although only eighteen, has completed his CPT instructor's course at Sky Harbor Airport.

Phoenix has been host to some aviation-minded notables recently . . . John Payne, young Hollywood leading man, enlisted in the Army Reserves to begin civilian training here "to get away from publicity" . . . Brian Aherne, another motion picture star, also has been brushing up his flying here with the idea of putting it to use in the war effort . . . And Martin (Monti) Arrouge, noted skier and husband of Film Actress Norma Shearer, likewise has been receiving flight tests at Sky Harbor . . . Maj. Alexander de Seversky, whose book "Victory Through Air Power," has raised a storm of controversy, visited Thunderbird Field, primary training school near Phoenix.

Announcement that the Civil Air Patrol would be used to patrol the Mexican border led to a number of local CAP pilots to expect quick calls to duty, since many of them had listed that exact chore as their preference as regards active missions . . . Many also wanted courier service between air fields . . . It's understood local flyers soon will be given courier routes between fields in Arizona, New Mexico and Utah . . . Five more Latin-American pilots, from Guatemala, Cuba, and Costa Rica, have arrived here for Link trainer instruction, last lap in their civilian pilot training sponsored by federal government "scholarships." One group of "south of the border" flyers completed the course recently and now are spreading air doctrines in their home countries.

BOB ALLISON

Enlist in your CIVIL AIR PATROL

Fifth Ferrying Command

What's Cookin'

Ole Jimmie Lovell is giving out with the stuff at his new business address, Love Field, for the Command, and is a private in Uncle Sam's Air Force . . . Lieut. Charleton Fincher can give you or me any of the giveable facts and figgers about his department, which is Public Relations . . . Funny how all the Dallas lads manage to wind up out here doing so many of the things they are best qualified to do . . . makes good sense.

Three Dallas "doers"—Layton Humphreys, Charles Link, and "Bill" Bonner—came out, joined up, and are full-fledged members of the best bunch of pilots and personnel in the Ferrying Command. . . . (who said we were prejudiced?) . . . Not only that, but Bill Hudson, from Cowtown, is a civilian pilot, as of this last month, and he says that a whale of a lot of good material comes out of Fort Worth, too . . . Oh, well! . . .

Lieut. Clarence Norsworthy is on the beam and cutting a mean lot of work out in the usual Norsworthy manner . . . Lieut. David Stephenson has been out of the city a great deal—why, we can't imagine; where, we simply don't know — but it must have something to do with an airplane, on account of there are so many out here . . . (three, by actual count) . . . Lieut. Ralph M. Woods said to tell everybody in Wichita Falls "hello" for him . . . "Hello, Wichita Falls!" . . . (that's a takin' care of that little detail) . . .

DeWitt Nogues wound up settlin' down here, and Oklahoma City lost a good man when Earl Slick wanted to hit a few hot licks for the good of the airplane business. . . . . This flyaway field has a lot of advantages.

Colonel Ferguson finds the new offices well pounded and announces that the next time a carpenter gets him out of the place it will be because they are fresh out of noise . . . he's that used to it.

Everybody wants to know the one about the little moron who said "at all . . . at all . . . at all" . . . something to do with a broken record? . . . just ask Captain Tompkins. All this stuff is strictly off the back burner, and any resemblance to anyone living or living is purely coincidental. Your thriving scribe . . .

OLE TONY

YOU ASKED FOR IT . . .

and

HERE IT IS!

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Civil Air Patrol Cadets Organized for High School Students with 1,000-Squadron Goal

The Office of Civilian Defense has launched an intensive organization drive for the Civil Air Patrol Cadets, a young people's volunteer aviation corps paralleling the setup and activities of the senior CAP.

Membership will be limited to native-born students in their last, or next to last, year of senior high school. Eligibility for flying duty will not be available, however, until after their completion of cadet training and their graduation from school when they will be allowed full membership in the senior CAP. Flying assignments require a minimum age of eighteen.

Training courses will include navigation, meteorology, radio and other subjects similar to those required of senior members, and they will be drilled in first aid, gas protection, code signaling and other defense work.

A local unit will consist of a squadron command, with subordinate flights at outlying airports, and each squadron will have a commanding officer, executive officer, intelligence officer, training officer and communications officer. The number of local units at first will be limited to a total of 1,000. Many were organized immediately following the announcement of the organization.

Many Wings Streamlining Groups Into Squadrons

Group commands, which numbered 287 last May, but became an unnecessary layer of organization in some Wings, are being telescoped into squadrons so rapidly that there there are now less than 150 groups and at least eighteen states have eliminated groups entirely. But CAP is not dwindling, for the total number of squadrons has remained around 650 for some time, and some have been telescoped into flights for organizational efficiency.

Free Rides for Bond Buyers Prove Success

Squadron 213-1 of Syracuse, N. Y., recently sold over $26,000 in war bonds and stamps by offering buyers free rides. It initiated the stunt on Labor Day, when $11,000 worth of bonds were sold. All the buyers couldn't be flown before sundown, so the squadron returned on October 11 to ride the holdovers and $15,200 more was added to the pot. A survey was made of the riders and eighty-six of 128 who went up on the last day had never flown before.

A "Housecleaning Week" staged by the Lockheed and Vega Aircraft Corporations yielded eighty-seven tons of metal and rubber scrap with a replacement value of $500,000. It was converted to the war effort.

I. W. BALDWIN, aviation manager of the S. F. Bowser & Company, Inc., is executive officer of Group 523 of the Indiana Wing. He and his Culver are on call for any CAP assignment.

Airlines Seeking Men, Women for War Service

The Airlines War Training Institute, 1616 K Street, N. W., Washington, D. C., has asked the Civil Air Patrol to announce that they are looking for pilots, navigators, radio operators, flight engineers, and mechanics for training for wartime airline service to all parts of the world. Students are paid while training and both men and women are eligible to train as mechanic specialists.

Vultee Workers Form Squadron, Plan Airport

A total of 125 employees of the Vultee Aircraft plant at Nashville, Tennessee, have organized a CAP squadron, with Tony Nave as commander. They plan to establish their own air base and equip it with a hangar and other facilities.

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